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CONTENTS

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THE EUROPEAN RECOVERY PROGRAM*

Programs, Developments and Prospects in Agriculture

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MORE than half-time has passed since the inception of the four-year program of European cooperation for recovery. The policies and developments expected under it have had a chance to take effect. With the aggravation of international political tension in recent months the need for military preparedness has become more pressing both in America and in Europe; and the demands that this need will make upon the resources of the West must, no doubt, affect the prospect for a continuation of the program, or the way in which it can be continued. A review of what has happened thus far and what still would remain to be done may, therefore, be appropriate at this juncture.

The following condensed account of a complex picture is confined to the consideration of agriculture and agricultural products which are of outstanding importance in the work for recovery. Because it is thus confined to a segment of the program and a segment of the economy, it is not complete in the scope of the subject with which it deals. There are many aspects, measures, and developments of a general economic character which the review does not consider, even though they are of great importance to the program in the field of agriculture and agricultural products as well. The program's impact on industry, its aid to the restoration of financial stability, to the recovery of trade in general and to the improvement and stabilization of social and political conditions have had

* This article expresses the personal viewpoint of the writer and does not necessarily reflect official views or policies.

an important bearing on developments in agriculture and in the markets for agricultural products. Conversely, the developments under the program for agriculture were important determinants in other areas of economic, social and political achievement. The increase in agricultural productivity and output improved the food situation and lessened the severe pressure on the foreign balance, thereby contributing much to the rise in industrial employment, productivity, and output; and hence to the improvement and stabilization of general economic, social and political conditions. Whatever our starting point and wherever we turn we find ourselves in the midst of a complex system of inter-actions where cause and effect are only different aspects of the same phenomenon. It is only at the point of entry of an extraneous force or influence, clearly not part of that system itself, that a primary causal factor in the chain of events can be perceived.

The European Recovery Program and the material aid extended under it is such an extraneous force. It is in this sense that it can be considered an independent factor in the recovery of Western Europe. As may become apparent in the discussion, it has been an *important* factor in that recovery. But there the claim to success and achievement must end. Without those actions and interactions that developed and were fostered in the countries themselves, United States aid would have been of little avail. That this aid was greatly magnified by the countries' own individual and cooperative contributions, by the inherent vitality and elasticity of their society that only a few years ago had stood petrified in the exhaustion in which the war had ended, in a deeper sense is perhaps the greatest accomplishment of a policy that had built on precisely such expectation. The people of the United States can proudly acknowledge the success with which West Europe has worked for its recovery.

ECA Aid

As a result of the dislocations in the international economic structure—which partly had made their appearance in the interwar period, but were vastly intensified by the second World War—Western Europe at the end of that war was without sufficient production and reserves of international buying power to cover essential needs. Neither the requirements of consumption, even at modest levels, nor those for the rehabilitation of production could be satisfied without foreign help. The material means for this pur-

pose—in terms of commodities and services—were largely to be had only from the so-called dollar area, especially the United States. How to supplement Europe's dollar purchasing power—which had dwindled with the reduction in dollar earnings and the liquidation of gold and dollar assets—was, therefore, the big problem. United States aid since the war, in various forms and, finally, under the European Recovery Program, provided this badly-needed supplement.

If it is considered that American financial aid at no time exceeded five percent of the national income of the ERP countries—and in several important cases was much less than that—the question may well be asked how this aid could have been of such great significance. The answer is well illustrated by conditions with respect to agricultural commodities. It was precisely in the lack of key products that Europe's difficulty arose. Their provision through ERP aid greatly magnified the significance of this help as measured by its amount in dollars and cents, since it made possible a recrudescence of domestic economic activity and output, in the countries concerned, to an extent that greatly exceeded the value of the direct financial aid received. Many agricultural products represented such key commodities. In the first two years of the European Recovery Program ECA-financed imports of food and feed accounted for over 10 percent of the countries' aggregate food energy intake; for almost half of their mill consumption of raw cotton—the most important raw material of one of West Europe's most important industries; and for one third of the total consumption of tobacco—the most important item of commodity consumption after food and clothing. In the first two years and a quarter of the Program, 4.4 billion dollars or about one half of the total dollar aid extended by the United States went for the procurement of agricultural commodities, including agricultural machinery and tractors.

American aid under the European Recovery Program is not, of course, confined to this provision of material assistance. By using its influence and authority with respect to the disposition of the local currency funds accruing to the respective governments from the domestic sale of goods and services obtained free under the grants, the Economic Cooperation Administration is assisting the governments in directing capital into productive channels of investment within the countries. Agricultural investment plays an important part in this program.

Another important type of assistance is the technical help and

advice in connection with problems of production and management which the United States is able to extend. This help takes many forms and is one of the least costly, yet in the long run perhaps one of the most influential parts of the program. Under it, as far as agriculture is concerned, European study groups visit the United States to familiarize themselves with advanced methods of production, organization, management and research—methods of possible applicability in their own countries. Conversely, American specialists go to Europe to study local problems and to assist Europeans in improving their technical services, research programs, and practices in particular lines of agriculture. The work of the staff of the Economic Cooperation Administration with the European governments and institutions as well as with the Organization for European Economic Cooperation is part of this activity. ECA also provides funds for the purchase of scientific equipment under various technical assistance projects.

Finally, the existence of the ERP program as such has been a powerful force in strengthening the countries' efforts and uniting progressive elements everywhere. It has broken down barriers to the exchange among the nations of advice and experiences, has compelled a measure of cooperation, and has stimulated the urge to do and to act.

The Countries' Progress

The functional significance of American aid under ERP becomes apparent when we consider the changes which the countries have contemplated under this program. The tendencies these plans reveal in policy, in production, consumption, and trade are not trends that the European Recovery Program has forced upon the countries or induced them to choose in preference or as an alternative to others. Rather, they are trends inherent in the general economic, social, and political situation in the countries concerned and in the rest of the world. The changes and adjustments that they imply and call for, both in Europe and in America, would have had to be abrupt and precipitous if the United States had not stepped in with its aid to cushion their impact both upon West Europe and upon America. This is the real significance of ERP aid—with its far-reaching ramifications for the economic, social, and political developments in Europe. Where precipitous change might have entailed economic and social disorganization, irreparable within

the framework of the social and moral concept of the western world, the time gained for recovery of the innate vitality of the area seems to have made possible more gradual and orderly change in the period during which a measure of American aid continues.

Agriculture has always occupied an important place in West Europe's economy. Even in the highly industrialized countries of that area a substantial proportion of the national income was derived from agricultural pursuits. The importance of the industry was enhanced by its political influence which was and still is deeply rooted in the historical evolution of European society, and in considerations of social stability and national security. Developments during two great wars that brought many of the countries to the brink of starvation could but strengthen the belief that a substantial supply of foodstuffs and feedstuffs from production within national boundaries is desirable and necessary.

In present circumstances there is an additional factor that tends to favor policies of maintenance and expansion of agricultural production in the countries concerned. All of them have been measurably affected by the difficulties in the international exchange of goods and services that followed in the wake of the last war. Hence, the possibilities of employment of their labor on such resource utilization as is open to them through foreign trade appears to be limited. On the other hand, none of the countries is endowed with an abundance of natural resources within its own boundaries. As complete as possible a utilization of the primary resources which they do have thus becomes an imperative goal of national policies. For the same reasons, development of primary production of agricultural and industrial raw materials in the countries' dependent overseas territories has come to receive more prominent attention.

Although about one fourth of West Europe's population depends for its livelihood on agricultural pursuits, upwards of four fifths of its national income is earned by industry, commerce, and miscellaneous non-agricultural activities. West Europe before the war depended upon imports from outside its area for fully one third of the food it consumed, though some of these imports were in the form of feedstuffs converted into food by its own livestock industry. There were great variations in this dependence as among countries. The United Kingdom, for example, imported three fourths to four fifths of its food requirements; Norway, Belgium and Switzerland

about one half; Western Germany, the Netherlands, Austria, and Greece about one third to one fourth. France, Italy, Portugal, and Sweden depended on imported food supplies only to the extent of from five to 15 percent of their consumption while Denmark and Turkey were on a net-exporting basis.

While in the British Isles, Switzerland, and Sweden, as a matter of deliberate policy and backed by the requisite physical means, agricultural production during the war expanded measurably, most other West European countries suffered considerable declines, especially at the end of the war; and a low point in production occurred in 1945 and 1947 when widespread drought had reduced crops greatly below their trend levels. In the consumption year 1947–48 gross agricultural output was still about 20 percent below prewar, or 25 percent below on a per capita basis.

Neither in production nor consumption of agricultural products do the countries participating in the European Recovery Program contemplate, at present, any revolutionary developments and measures, substantial though their efforts are to regain a larger degree of self-support. The adjustments that have already been made and are to be continued include an expansion of production both in the metropolitan areas of the countries and in their overseas territories. They further include expansion of trade with countries outside the dollar area and, finally, efforts at increasing dollar earnings and a reduction in expenditure on imports and services from the dollar area. To a large extent these tendencies are movements toward more nearly prewar conditions: with respect to agricultural production, the maximum expectation for the area as a whole would be the achievement of prewar per capita output; with regard to trade, expectations would center around a revival of commerce with non-dollar areas toward their prewar share in total trade.

The progress which has been made can be measured against the well-known goal of the program to enable the countries to support themselves, at reasonable standards of living, without extraordinary financial assistance from abroad. Hence, it may be expressed in terms of the gains recorded towards improvement in the standard of living, present or prospective, on the basis of greater self-support—that is, a declining volume of foreign assistance. Self-support, at high levels of international trade, is here contrasted with self-sufficiency, at low levels of international trade. In the field of agriculture and agricultural products the questions to be answered would thus read as follows: To what extent has there

been an improvement in the consumption of agricultural products as a component of the standard of living, or an increase in investment promising higher standards of living for the future; to what extent has such improvement been made possible by larger domestic effort in the production, directly, of the commodities concerned, and increased intra-area trade; and to what extent has larger domestic effort with respect to the production of agricultural commodities, or of goods manufactured from such raw products, made possible larger exports to countries outside the ERP area, thus contributing to a reduction of the dependence of the area's standard of living upon financial assistance from abroad? A consideration of these points gives, on the whole, an encouraging answer.

Although the countries have not in all fields reached the intermediate goals programmed for 1950, and even though they may not fully reach, by that time, the longer-term goals set for 1952, there is no doubt that great progress has been made. Food consumption per capita has risen, since 1947–48, by 10 percent in the aggregate, and more than that in the low-level countries. Rationing has been largely eliminated, and some areas have reached prewar consumption, both in quantity and quality. Food is no longer a problem, any more than it normally is in an imperfectly organized human society. The supply of the population with textile goods has measurably improved since 1947, although it is still insufficient to cover reasonable needs, as is evident in the high prices of clothing in relation to incomes. Tobacco consumption has risen appreciably, and in few countries remains below prewar per capita standards.

Agricultural production in the ERP area has increased, since 1947–48, by one fifth—only partially due to more favorable weather in the past three seasons, as the much greater input of fertilizer (one third above prewar), greater mechanization (40 percent more tractors than in January 1948), and other improvements indicate. At the half-way mark of the program, such production stands just about half-way between 1947–48 and the goals for 1952–53, and has shown a recovery measurably faster than after the first World War. Intra-area trade in agricultural products—which makes available to other ERP countries increases in production in surplus-producing areas—has risen from half the prewar volume in 1947 to three quarters in 1949–50.

To what extent the increase in intra-area food output has les-

sened the countries' dependence on foreign aid, despite the rising consumption, is shown in the reduction of total imports of food from the high levels of 1947–48. Even though imports of fats and sugar are larger, total imports of breadgrains were reduced from 18 million metric tons in 1947–48 to about 13 million metric tons in 1949–50. Larger utilization by the countries of domestic resources to pay for supplies from abroad is reflected in the increase of imports from areas where they could acquire goods only for outright payment, not as grants or on credit.

Larger output of agricultural products, or of goods manufactured from such products, has, however, not only made possible an increase in consumption and a reduction in imports, but also an increase in exports. Modest though the latter has been, it does contribute to the extent to which the countries move toward greater self-support. There are few agricultural commodities that the ERP area exports to other parts of the world, and the total volume and value of such exports have never been very large.

The substantial increase in agricultural production which has occurred under the Program would by no means be an unquestionable gain to the countries, had it taken place at increased unit costs. There is every indication, however, that such increase in production has on the whole come about through increased productivity. Agricultural output in ERP Europe today is clearly higher per acre, per man and per animal than it was three years ago, and the higher rate of input other than from land, labor, and livestock capital does not seem to have outweighed these gains.

Finally, longer-term investment, as an expenditure to make possible the increase of future consumption, as far as agriculture is concerned, has also shown gains, although on an inadequate scale. Data available at this time do not, however, permit of unequivocal conclusions in this respect. Similarly, the development of production in the dependent overseas territories of the ERP countries is not sufficiently reported to be reliably judged. It, too, requires a measure of investment and educational effort that is probably not now being applied on a scale commensurate with the Program's expectation of supplies from those areas.

Remaining Tasks

A statement on what the countries still will have to do to be successful in their Program and beyond, is, to some extent, at the

same time an indication of where they have hitherto failed in the implementation of the plans. Two specific categories of measures or policies—and possibly three—require urgent and prolonged attention. Continued technological progress in farm management on which so much depends can only come about if a majority of the millions of farmers in the ERP area responds to the call of their leaders with a great and, possibly, unique effort. For this it is necessary, first, that economic incentives and financial facilities make it profitable and practicable for the farmer to make the required improvements and investments. There is still much room for efforts or measures to restore sounder price-cost relationships of the sort that will further production in a direction to which West Europe is suited and which it can afford. Second, the organization of the extension services through which farmers can be reached with technical and economic information must be greatly strengthened and improved over what is now available in most of the countries. A third point is the need for investment and reasonable facilities for investment of both short-term and long-term character. The countries will have to do more in this respect than they have now provided for, if agriculture is to progress on a sound basis. Investment needs are great, and have been neglected, in reference to the consolidation of scattered land holdings, the modernization of old and the construction of new farm buildings, and the provision at favorable terms of production credit.

There are a number of other needs that call for action which either are in a less specific category, or apply to a geographically limited area. They are no less important. To mention only two examples: Continued and expanded research, with much international exchange of results, experiences, and advice; in this are included the important surveys of soils and of other natural and of economic conditions that determine or affect the prospects of agricultural production and trade. A second example is such social and economic improvements as land reform in parts of Italy which have not only a bearing on the integration of large numbers of the agricultural population into a progressive economy, but also upon social and political stabilization at large, without which no nation can progress.

Conclusion

There are only two possible concepts in the light of which the goals in the countries' programs for agricultural production and

trade might be judged: (1) Are they likely to be achieved? (2) Are they in themselves "right" or appropriate goals? On the first point it has already been indicated that there might be some shortfall, by 1952, in the execution of the production programs, though substantial progress has been made to date. The trade programs, with their expectation of larger supplies from non-dollar areas and dependent overseas territories, will not be completely fulfilled either.

On the second point, it is a problem in itself to decide what is a "right" or appropriate goal. Questions of international security, of political expediency in policies vis-à-vis certain classes of producers or consumers, and of a general judgment as to the type of economic and political world we are likely to have in the future cannot be neglected in this determination. These factors have no doubt led the countries to favor or tolerate a pattern of production which is at variance with the economically optimal use of resources in an international economy of comparatively free trade. In adjusting and expanding production the problem is one of directing resources to those types of products for which European resources are especially adapted, and in which Europe can compete effectively with other producing areas. However, since we are still far from an international economy of comparatively free trade and mutual assistance in maintaining high levels of economic activity, and still further from an international situation that would permit security considerations to be minimized, there are narrow limits to such redirection of resources. The main problem is to avoid unnecessarily uneconomic resource utilization and to see to it that *among the practical alternatives* the choice falls upon the relatively best.

In this respect developments under the programs have not been unsatisfactory. That Western Europe, in the circumstances of this era, should find it advisable to strive for a restoration of agricultural production to the prewar per capita level is understandable and probably unobjectionable. That the countries would do at least that much, and possibly more, in historical perspective would seem to find some economic justification in the fact that the terms of trade of Western Europe have deteriorated compared to prewar days—that is to say, prices of its typical import products, such as foodstuffs, feedstuffs, and raw materials, have increased in relation to prices for its typical export products such as manufactures. Also, Western Europe has considerably decreased its relative dependence on feed supplies from outside the area, com-

pared with prewar, and intends to continue along this line. This tendency is technically and economically sound: it is in the output of feed and livestock products that most of Western Europe's possibilities for expanding agricultural production are greatest; it is in this type of production, as against grain, that most of the area's comparative advantage lies—both from the point of view of natural conditions and of location of production in relation to markets; and it is in this type of production—feed and livestock—that further increase in output, if realized, must come from increases in technical efficiency of production, of management, and of feeding.

To what extent the gains made by the countries under the European Recovery Program can be retained and further expanded is, at this juncture of the international political situation, unpredictable. Defense requirements may cut deeply into the standard of living of the people and may, in their demands upon factors of production, greatly impair the possibilities for investment in the civilian sector of the economies, including agriculture. They may even reduce the supply of such input items as are currently needed for a maintenance of present levels of output. In the case of war, overseas imports into Western Europe would be greatly reduced, progress in agriculture would stop and the food situation would face a deterioration more immediate and much more serious than that which occurred during the last war.

On the other hand, given peaceful developments, there is no reason why West Europe's agriculture should not be capable of substantial improvements in productivity and total output, in the longer run even much beyond what is now envisioned. Nevertheless, for the foreseeable future, Europe will remain greatly dependent on food supplies from overseas, especially dollar, sources. It will even be more dependent upon supplies from these origins, relatively to program goals, for such an important commodity as cotton, since the program for trade with, and expectations of supplies in, other areas do not give promise of fulfillment. West Europe will, therefore, face a difficult situation when ECA aid ends in 1952, even if the present agricultural production program is completely successful, and even if rearmament does not impose additional strains on the foreign and internal balance. The supply, by that time, of dollar purchasing power, will still fall short of dollar needs; and whatever the improvement in the dollar earnings of certain overseas territories, due to the recent rise in raw material

prices, may signify, it is surely not a permanent change in the terms of dollar trade. Unless there are developments, on an international scale, not now in prospect, it is clear that American exports to West Europe will be further reduced.

General consumption in Western Europe, including that of food, fiber, and tobacco, would thus have to be curtailed. Also, there might then be a forcible expansion of agricultural production, regardless of comparative advantage in an integrated world economy, of the type least desirable from the point of view of eventual return to a system of high level international trade and prosperity. These are developments that farseeing statesmanship on both sides of the Atlantic will be called upon to prevent by timely agreement and action.

The present statement was not intended to be a review of the effect upon the United States of the European Recovery Program, but of the developments under it in European agriculture and with respect to agricultural products in Europe. Nothing has therefore been said about the benefits consumers and producers in the United States may derive from European recovery. However, European recovery was, and still is, a vital interest of the United States. It is because of this realization that the European Recovery Program was conceived. It is prosperity, not poverty, in the rest of the world that contributes to the welfare of the people in the United States. That does not mean that every producer of any commodity that may now have, or at one time had, a market in Europe could directly reap profits from European recovery. On the contrary, recovery in Europe and its overseas possessions means greater productivity and production there; and greater productivity and production anywhere in the world must mean greater competition at least to some American producers, either in Europe, or in the United States, or in third markets. Some of our markets must thus be restricted or even lost. Others, however, will expand, the burden upon the American people of financial assistance to other nations will be lightened, and consumption in the United States as well as elsewhere will in the end rise as a result of the all-round process of increasing production. That is only elementary economics. We must keep in mind, therefore, that there is an overriding general interest in world recovery that does not necessarily coincide with the immediate and direct interests of individual producers, but which ultimately confers superior benefits upon the nation as a whole. That is, if war does not undo the work that has been so hopefully begun.

THE ECONOMICS OF LAND CLASSIFICATION FOR IRRIGATION

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A SOUND appraisal of the land resources of a proposed reclamation project has an economic importance that cannot be emphasized too strongly. The earliest land classification work of the Bureau of Reclamation began when the first projects were investigated and authorized in 1903. The primary purpose was to delineate the area which could be served. The chief factor considered was the elevation of the land in relation to the water surface elevation in the laterals. Smoothness and degree of slope was considered also, as was freedom from timber, rock, brush and other obstructions, but the limits placed on irrigability were very wide and not precisely defined. Soils analysis played little part in the early classification scheme. Such soils information as may have been available to the planners of early projects was passed over lightly or ignored entirely. An early report (about 1910) states, "A topographic survey reveals all the essential facts necessary for wise selection (of irrigable land) and collects and assembles the facts in the cheapest and most thorough manner."[1]

The Department of Agriculture made soil surveys of some of the earlier projects. A good example of this type of survey is found in the Strahorn report on the Belle Fourche Area of South Dakota.[2] In this examination about 121,000 acres were covered. Of this, about 80,000 acres were described as clays and clay loams, extremely tenacious, with alkali present and no evidence of downward movement of water. About 27,000 acres were described as good agricultural land, much of which was already being irrigated; and about 14,000 acres were reported mixed in character. This information, though valuable to the Bureau of Reclamation and to the prospective settlers, was too little and too late. It was too late because the project was under construction two years before the

* This paper expresses the personal views of the author and does not necessarily reflect the opinions and policies of the Bureau of Reclamation.

[1] *Tenth Annual Report*, U. S. Geological Survey, pt. 2, p. 33. (Requoted from *Fact Finder's Report*, p. 44. See footnote 3.)

[2] Strahorn, A. T., and Mann, C. W., *Soil Survey of Belle Fourche Area*, Bureau of Soils, U.S.D.A., 1908.

soils survey was made and water was available eight months before the results of the survey were published. It was too little because the author did not positively state that the clay soils were not irrigable, though it is evident from reading between the lines of the report that he had grave misgivings about their suitability. In addition, the survey would now be considered very general in character, because the results were mapped on a scale of about one inch to the mile and topography was mapped with a contour interval of 20 feet. Seven soils series were described and mapped, but in some cases there were wide differences in the character of the soil within a series.

Even where the results of these soil surveys were available in time, there was little attempt to evaluate their economic significance in relation to topography and the availability of water. The Bureau of Reclamation did not have adequate facilities or personnel for making detailed soil surveys and the function of the Bureau of Soils was to make studies of soils and general recommendations as to their use and management. Thus, in the early days of reclamation, the various factors of soil, topography, climate, and availability of water were evaluated separately, but in most cases their combined effect on the net income of the farmer was left to chance. In the latter part of the period prior to 1924 more attention was paid to soils analysis; some projects under investigation had competent soil surveys which were used to determine the irrigable area.

The year 1924 was an important milestone in land classification in the Bureau of Reclamation, for this was the date of the Fact Finder's Report.[3] The report was the work of six men selected by the Secretary of the Interior to investigate all Federal reclamation projects to determine why so many were in arrears on the payment of construction charges. It represented the first large scale economic analysis of Federal Reclamation. The committee examined in detail 32 projects or divisions of projects, and made recommendations on each one. These recommendations, with the number of projects or divisions to which they applied, were as follows:

Reclassify the land	13
Adopt the 5% contract	14
Turn operation & maintenance over to the district	12

[3] *Federal Reclamation by Irrigation* (*Fact Finders' Report*), Senate Document no. 92, 68th Congress, 1st session, 1924.

Adjust construction obligations	14
Further special study	13
Abandonment	6

Some of these recommendations may need explanation. The five percent contract calls for annual construction payments equal to five percent of the average gross crop value of the 10 years just past. The recommendation of turning operation and maintenance over to the irrigation district was based on the assumption that the district would be able to operate the system better than could the government. The present policy of turning the operation of the project over to the water users as rapidly as possible is based on this recommendation. The recommended special studies varied from one project to another, but included the following: adjustment of construction charges, a feasibility report as a requirement to further construction, a special land classification, adjustment of acreage to water supply, method of increasing water supply, cost allocation, and methods of disseminating information on better farming practices to the settlers. Of the six projects recommended for abandonment, two had already been abandoned, and for two others the recommendation was made conditional. These latter two are still in operation.

The purpose of the land classification was "to secure information on which the project lands may be classified with respect to their power . . . of supporting the farmer and his family and to repay construction costs."[4] Here is the first official recognition of the present concept of ability to pay. Boards of Survey and Adjustment were appointed to carry out the classification work. These boards divided the land into six classes. The best irrigable land was placed in Class 1, with progressively less desirable land placed respectively in Classes 2, 3, and 4. Land believed to be temporarily non-irrigable was placed in Class 5, and permanently non-irrigable, in Class 6. It was recognized that physical differences in the land would be reflected in net income in three different ways: (1) by differences in gross income (crop yields), (2) by differences in investment costs, and (3) by differences in operating costs. Definite standards were not specifically provided, but were developed for each project as the survey progressed.

The combined effects of soil texture, depth, salinity, organic content, slope, undulation, drainage, and freedom from obstruc-

[4] *Fact Finder's Report*, p. 4,

tions were considered, and an attempt was made to measure these factors in terms of payment capacity.[5] The measurement was largely based on judgment, in the light of known experience under similar conditions. This really does not differ from the present method of arriving at classification standards, but now 25 years' more experience on which to base judgments has been accumulated; new economic measures such as the farm budget have been developed for presenting the judgments in an organized fashion; and better laboratories have been established and more careful field techniques have been developed for more precise measurement of the physical factors.

The method of delineating land classes and tabulating the results was significantly different from present day methods. Land class boundaries were drawn in the field much the same as at present, but the final land class was tabulated on a "farm" basis, the farm in this case meaning the original farm unit as established in the public notices, or in some cases a 40-acre tract. On some projects the field sheets were not reproduced for general distribution, and were available for examination only in the project office.

It should be borne in mind that the first classification jobs completed under the Fact Finder's Act were on existing irrigation projects, many of which had been irrigated several years. Farm experience on the land played a large part in the classification, and in some cases the final class placed on a particular piece of land may have reflected the superior (or inferior) managerial ability of an individual operator, rather than an accurate estimate of productivity. In addition, many cases of inequities may have resulted where a piece of land had been carefully leveled, thus hiding the original topographic deficiency. Here again is a case of classifying the management rather than the land. Such discrepancies were not intentional, but were the inevitable result of classification where the land was already in production.

On many projects the results of the land classification were used to apply a differential construction payment by classes, but the rates used did not always represent the real differences in payment capacity. For several years the construction payments on the Frannie Division of the Shoshone Project, for example, provided for a

[5] Where used in this paper the term "payment capacity" means the amount remaining to the operator after all costs except water charges have been met and after an allowance has been made for family living. It represents the amount the farmer can afford to pay for water.

spread of 10 cents per acre between each class and a total spread of 30 cents between Class 1 and Class 4. Later studies indicated that a wider spread between classes was more equitable.

For several years the Fact Finder's Act[6] provided the basic authority for land classification on new projects under investigation. On new projects it was possible to do a better job, because the original character of the land was observed and there were no management factors to confuse the classifier.

The Reclamation Project Act of 1939[7] strengthens the authority given in the Fact Finder's Act for dividing the land into several classes for payment of construction, but the main emphasis is on reclassification of land already in production rather than on classification of new projects. The language of the 1939 Act clearly defines the purpose of the classification wherein it provides that the repayment contract may require the irrigation district to "vary its distribution of construction charges in a manner that takes into account the productivity of the various classes of land."[8] Neither of these two Acts specifically mentions any other purpose for the dividing of land into classes, though the Reclamation Manual suggests several others.[9] For the balance of this presentation, therefore, the discussion of land classification will revolve around its use as a means of determining repayment of construction.

The current classification scheme of the Bureau of Reclamation differs little in fundamentals from the work done under the Fact Finder's Act. It seeks to do two things: (1) eliminate areas which cannot pay water charges and (2) segregate irrigable land into groups according to ability to bear construction charges. Three kinds of classification are recognized—reconnaissance, semi-detailed and detailed, which differ from each other mainly in the degree of intensity used in the field and laboratory examination. Physical standards have been formalized and written up in the Reclamation Manual for the guidance of the classifiers in the field. With these improvements, however, the classification is designed to show the same end results that were shown in the work done 25 years ago—that within any one area land of different classes varies

[6] Act of December 5, 1924, Ch. 4, 43 Stat. 672.
[7] Act of August 4, 1939, Ch. 418, 53 Stat. 1187.
[8] Sec. 4(g) of the 1939 Act.
[9] *The Reclamation Manual* is the official handbook of the Bureau of Reclamation. It documents official policy as to the methods to be used in investigations and in project operations.

in ability to pay for water, and that within a class this ability is generally the same for all parcels of land in the class even though the variations are due to differences in gross income, investment cost, or operating costs.

Although the final product of the classification is economic in nature, physical standards are required for the guidance of field personnel in examining the land and mapping the various classes. The standards prescribed for classification work in North Dakota specify the upper and lower limits of the physical characteristics to be found in the soil, undulation, field size, gradient, vegetative cover, occurrence of rock, and drainage. For Class 1 soil the texture may range from sandy loam to clay loam, the depth must be 36 inches to sand or gravel, 60 inches to solid rock or shale, or 18 inches to a penetrable lime zone. The total salts must not exceed 0.2 percent, and the pH must be 9.0 or less. For Class 2 soil the texture may range from loamy sands to very permeable clay, the depth must be 24 inches to sand or gravel, 48 inches to solid rock or shale, or 14 inches to penetrable lime zone. The total salts must not exceed 0.4 percent, and the pH must be 9.3 or less. For Class 3 soil similar but less restrictive standards are provided.[10] For undulation the standards are expressed in terms of the quantity of earth which must be moved in the leveling process. Class 1 undulation requires the excavation of less than 175 cubic yards of earth per acre; Class 2, 175 to 350 yards, and Class 3, 350 to 650 yards. For Class 1 field size the fields must be eight acres or larger and the irrigation runs must be 400 feet or longer, for Class 2 the fields must be five acres or larger and the runs must be 300 feet or longer, and for class 3 the fields must be two acres or larger and the runs 150 feet or longer. For gradient the standards are expressed in terms of percent of slope. For Class 1 the slope must not exceed two percent; for Class 2, six percent; and for Class 3, 10 percent. Similar standards, expressed in physical terms, are prescribed for vegetative cover (brush and trees) and for rock which occurs on the surface or in the plow zone. For drainage the standards are much less specific. They are as follows:

Class 1—no drainage anticipated.

[10] This is necessarily an abbreviated description of the standards. Under special conditions deviations are permitted; for example, class 2 soil need be only 20 inches in depth to gravel if the gravel contains soil and if the water holding capacity is adequate. The pH readings given are for a one to five dilution of the soil solution; readings taken from a soil paste must be lower.

Class 2—slight drainage problem anticipated but may be improved at relatively low cost.

Class 3—drainage problem anticipated but may be improved by expensive but feasible measures.

In applying these standards the physical factors are examined in the field and in the laboratory. Letter symbols and numerals indicating the class are placed on the map to identify each area significantly different from others. The maps are drawn to a scale of 400 feet to the inch for detailed work. The final land class is determined by evaluating cumulatively the classification placed on each separate factor. Any area which meets the standards for class 1 in every respect is mapped as Class 1. If land is Class 2 for any factor the final land class must be 2 or lower, and if it is Class 3 for any factor the final land class must be 3 or lower.

A good example of how the land classification scheme has been improved over the years is the work recently done on the Crosby-Mohall Unit of the Missouri-Souris Division. Detailed land classification was available on a 45,000 acre sample area known as the Bowbells Block, located adjacent to the town of Bowbells, North Dakota. Complex combinations of factors below the class 1 standards occurred with alarming frequency. A large part of the area was tentatively designated as Class 5 land, pending an economic investigation to determine whether or not it should be placed in a non-irrigable class. Here the application of the standards led to serious doubt that the recognized differences in physical characteristics added up to a uniform payment capacity in different kinds of land within a class. Accordingly a committee was formed to study the various factors and evaluate each one of them separately as to their effect on payment capacity. Four factors were selected for special study: soil, undulation, size of field, and gradient. These factors were selected because deficiencies in each of them occurred frequently in the study area and because they seemed to be the factors which were most likely to be out of balance with one another. The basis for comparison was Class 1 land, as defined by existing standards. The study proceeded on the assumption that all Class 2 land should have the same payment capacity regardless of whether it was Class 2 because of soil, undulation, field size or gradient and likewise all Class 3 land should be equal in terms of payment capacity.

Soil deficiencies were given special attention, for there are

several reasons why Class 2 or 3 soil may be less productive than Class 1. In texture, it may be either too heavy or too light, it may be shallow, it may have excessive salt accumulations, or it may have too high or too low pH values. Soil that is Class 3 because it is too light might have a crop adaptability quite different from soil that is Class 3 because it is too heavy. In the Bowbells Block, however, most of the Class 2 and Class 3 soils were classified downward because they were inclined to be heavy, with relatively poor permeability. Salt content was usually a contributing factor, but lack of sufficient depth was not a common defect. Because the reasons for classifying soils downward in the study area were similar, the soil was treated as one factor, though it was recognized that in areas having widely different kinds of soils, that factor could be measured more accurately by dividing it into its component parts.

The next step in the analysis was to assign values to each of the four factors. The effect on gross income was measured in terms of progressive reduction from the yields expected on Class 1 land. Yield levels represented the composite judgment of technicians skilled in soils, economics, land use, and general agriculture; and were arrived at through exhaustive discussion, based on a comparison of the area with known production data and experience on existing comparable areas. While the final estimates were based on the combined judgment of the group, the known effect of soil, land leveling, gradient, climate, and other physical factors were objectively determined and utilized. Yields fixed for Class 1 land were 2.5 tons of alfalfa, 45 bushels of barley, and 13.0 tons of sugar beets, with similar estimates for other crops. For each factor under study, reductions from the Class 1 yield were estimated. For the soil factor, the yield reductions were intended to reflect lower native productivity. Class 2 soil was expected to yield 90 percent of class 1 and class 3, 80 percent (Table I).

The effect of undulation on yield was assumed to be due entirely to removal and disturbance of the topsoil in the leveling process. This was at first believed to be negligible, but later in the analysis when it was discovered that the standards for leveling were too restrictive they were liberalized to bring them into better balance with the other factors. After this adjustment had been made it was estimated that Class 2 leveling (assuming no soil deficiency) would reduce the yield to 95 percent of Class 1, and that Class 3 leveling would reduce it to 92 percent for hay and pasture and to 90 percent for other crops.

In the case of gradient, it was assumed that a Class 2 slope would be equal to Class 1 land in the production of grains and alfalfa, but would be 10 percent less than Class 1 in the case of row crops because of the erosion hazard. Class 3 slopes were judged to have 10 percent less yield potential than Class 1 for grain, eight percent less for hay and pasture, and 30 percent less for row crops. Size of field would not affect yields per acre but would reduce the productive area due to the greater proportion of the land occupied by turn rows, ditches, and other obstructions. This loss was computed to be four percent for Class 2 fields and eight percent for Class 3.

TABLE I. EXPECTED CROP YIELDS BY LAND CLASS FACTORS EXPRESSED AS PERCENTAGES OF LAND CLASS 1

Land class factor[a]	Hay and pasture	Small grain	Row crops
Class 1 land	100	100	100
Class 2 soil	90	90	90
Class 3 soil	80	80	80
Class 2 undulation	95	95	95
Class 3 undulation	92	90	90
Class 2 gradient	100	100	90
Class 3 gradient	92	90	70

[a] Each factor considered separately, and assuming for each that all other factors meet the standards for class 1.

The yields presented herein are judged to be the average that could be expected of an average farmer in an average year during the normal 40-year repayment period.[11] It is recognized that a good farmer might bring a field requiring Class 2 or 3 leveling up to class 1 productivity during the 40-year period. However, it is believed that with average management the yield reductions assumed for Class 2 and Class 3 leveling would be reflected throughout the repayment period.

The effect of these various factors on gross income was expressed only in terms of yield. There probably are other effects which were not measured. It is likely that the Class 1 land might be found to be adaptable to a wider variety of intensive crops than the lower classes, or that the livestock enterprises might vary with the class of land. After due consideration it was decided not to try to estimate this effect, because no pattern could be decided upon. For

[11] The 40-year period for the repayment of construction charges, authorized in the 1939 Act, may be preceded by a development period not to exceed 10 years in length.

example, there appeared to be no consistently logical reason why the percentage of sugar beets should be greater or less on Class 2 soil than it would be on Class 2 leveling or Class 2 field size.

Investment costs were considered next. The cost of preparing land for irrigation was computed for each kind of land, based on 1939–44 average costs per acre. It was assumed that all land, even Class 1, would need some leveling. The cost of preparing Class 2 and Class 3 soil for irrigation was considered to be the same as for Class 1. Class 2 and Class 3 leveling would naturally be progressively more expensive than Class 1 because of the greater quantities of earth to be moved. The development costs for small fields would be greater than for Class 1 fields because of the additional structures and ditches required and because of the higher cost of operating leveling equipment within the confines of a smaller area. The increases in cost on steeper slopes were judged to be due entirely to the additional structures required for adequate control of water. In the analysis each factor was kept separate. Only the investment costs associated with preparing land for irrigation were varied according to land class. All other investment costs were kept constant. An interest charge of five percent was used to reflect the annual capital cost in the payment capacity analysis. A summary of the per acre investment costs associated with the factors just described is shown below:

TABLE II. INVESTMENT COSTS PER ACRE

Land class factor	Cost per acre[a]
Class 1	$20
Class 2 undulation	41
Class 3 undulation	64
Class 2 field size	25
Class 3 field size	34
Class 2 gradient	19[b]
Class 3 gradient	25

[a] Includes only the cost of work done on the individual farm for leveling, ripping, smoothing and the construction of farm laterals, drains and water control structures. The cost of all work above the farm water delivery point and below the farm drain outlet is a part of the government's construction cost.

[b] This value is lower than for Class 1 because with the steeper slopes a somewhat less exacting leveling job is required.

Values were then assigned to reflect the differences in operating costs among the four factors. It was assumed that variations in soil and undulation would cause no permanent changes in operating

costs. For the factor representing size of field the requirements for labor and tractor hours increase materially as the size of field decreases. It was assumed that increases of 20 percent in labor requirements were appropriate for Class 2 fields for harrowing and harvesting, and 50 percent for irrigating. The corresponding increases for Class 3 fields were 28 percent for harrowing and harvesting and 100 percent for irrigating. Similar estimates were made for other operations. Because of the increased difficulty in controlling irrigation water, it was assumed that there would be a 25 percent increase in irrigating labor on Class 2 slopes and 50 percent on Class 3.

The combined effect of all these assumptions was measured by putting them together in the form of a series of budgets. It was assumed for the purpose of the analysis that each farm would consist entirely of one kind of land so as to permit only one factor at a time to vary. Thus for the farm budget used to represent Class 3 undulation it was assumed that the soil, the gradient, and the field size were within the limits prescribed for Class 1. Similarly, to represent Class 3 field size it was assumed that an entire farm would consist of fields of two to five acres in size, but that the soil, undulation, and gradient would be within the limits for Class 1 land. For all budgets the size of farm, the livestock enterprise, the amount of dry land, the allowance for family living, and all other factors which affect payment capacity were held constant, except those mentioned in the preceding paragraphs.

The results of the budget calculations show the relative payment capacity for the various factors, with the Class 1 land capable of bearing $11.50 per acre in water charges (Table III). The payment capacity for Class 2 undulation is about the same as that for Class 2 gradient, while the values for Class 2 field size and Class 2 soil are somewhat lower. For the Class 3 factor undulation shows a higher value than soil and field size, while gradient is lower. The differences observed were judged to be accurate enough to verify the standards as used, except in the case of Class 3 gradient, which has insufficient payment capacity to meet average operation and maintenance costs. Accordingly an adjustment was made in the standards, reducing the upper limit of slope from 10 percent to eight percent, thereby increasing the payment capacity for land with Class 3 gradient to about $3.00 per acre. For the other factors no adjustment was deemed necessary, as it was believed that fur-

ther refinement would be more academic than practical. The difficulty of making accurate field measurements of the exact amount of leveling required, the precise field sizes on a given tract, and the exact slope, suggested that additional refinements in standards would not necessarily result in a more accurate classification.

TABLE III. PAYMENT CAPACITY, BY LAND CLASS FACTORS

Land class factor	Payment capacity per acre[a]
Class 1 land	$11.50
Class 2 soil	7.40
Class 2 undulation	8.60
Class 2 field size	6.50
Class 2 gradient	8.70
Class 3 soil	2.50
Class 3 undulation	5.30
Class 3 field size	2.90
Class 3 gradient	1.10

[a] Rounded to the nearest $.10. It is important here to note that these figures show *relative* payment capacity; they do not necessarily represent the amount the farmer will be expected to pay for water.

This analysis resulted in a set of standards for which all Class 2 factors are roughly equal to each other and all Class 3 factors are likewise equal. Had the analysis stopped at this point, however, it would have been incomplete because the factors usually occur in combinations. For example, Class 2 soil frequently occurs on land requiring Class 2 or Class 3 leveling, or on land having Class 2 or Class 3 gradient. A large number of combinations are possible, and budgets were made to represent all the possible combinations of two Class 2 factors. The resulting payment capacity for each of the combinations was startlingly uniform, ranging from $3.11 for Class 2 soil combined with Class 2 field size to $4.55 for Class 2 soil with Class 2 gradient. This indicated that where two Class 2 factors are combined the final land class should be 3 because the payment capacity is so nearly the same as the value shown for Class 3 in Table III. Similarly, the effect of combining three Class 2 factors was shown to result in Class 6 land, and the combination of one Class 2 factor with one Class 3 factor also resulted in Class 6 land. The logic of this result is apparent when one stops to reflect that Class 3 land is, by definition, just barely able to pay a minimum construction charge. Thus, a Class 3 soil is marginal, and if it is further encum-

bered with the investment required for a Class 2 leveling job, it is forced below the margin.

This discovery resulted in a change in the application of the standards. Heretofore, an area having a Class 2 soil and requiring Class 2 leveling might have been called either Class 2 or 3, depending on the classifier's judgment as to whether the soil and the undulation were near the upper or lower limits for Class 2 in the particular field in question. Similarly, land having one Class 2 factor and one Class 3 factor might have been called either Class 3 or 6. In the Missouri-Souris District all land classification surveys in progress have been revised to reflect the principles expressed in the preceding paragraph. The net results of this analysis were (1) a more realistic appraisal of the relative importance of the four factors studied, (2) a relaxing of the standards in the case of the undulation factor and tightening them in the case of Class 3 gradient, and (3) a tightening of the methods of applying the standards. The effect on the final irrigable area depends somewhat on the degree to which the undulation and gradient factors are present, but in the sample study area the review caused a substantial reduction in the amount of irrigable land.

The analysis just described is not a finished job and it is not so intended. This is partly because some important factors in the classification scheme were not examined, and partly because the method consisted solely of obtaining the algebraic sum of a series of assumptions expressed in dollars. Let us consider the factors not analyzed separately. The soil factor actually consists of a number of subfactors which can be identified separately in the field or in the laboratory, but in this analysis soil was considered as a single factor. Perhaps an attempt should have been made to measure separately the effect of surface texture, subsoil texture, depth, salt content, pH, percentage of sodium, permeability, and other measurable characteristics. This was not done, partly because of lack of time and partly because the facts necessary for making some of the basic assumptions were lacking. The effect of timber and brush cover and the occurrence of rock were not measured. Neither of these are important in the area under study, but both are important in many other areas.

Drainage was not considered as a separate factor in the analysis, partly because of the peculiar position that it occupies in the construction and repayment scheme. The land development costs

shown in Table II contain an allowance for farm drains for the removal of surface water. Usually it is not practical for the individual farmer on an irrigation project to construct additional drainage works to provide for the removal of water below the surface of the ground. Where the removal of sub-surface water is required, deep open drains are constructed, and are financed as a part of project construction. The magnitude of the drainage cost does not in any way affect payment capacity if adequate drainage is provided when needed.[12] Therefore, for the purpose of this analysis, it was assumed that adequate drainage could be provided as a part of project construction, and that any reduction in yields caused by poorly drained soils was properly reflected in the yield assumptions made for the soil factor. This is not necessarily true. The whole subject of the economic impact of soil texture, permeability, salt content, drainage, and other factors needs further investigation. Whether or not their effects are cumulative, or whether they dovetail together and are most properly evaluated in the aggregate are questions still unsolved.

Another problem not solved was the method of handling cases where two or more factors were near the upper or lower limits of a class. Suppose, for example, that a given piece of land were just barely above the class 1 limits for soil, and likewise just within the limits set for class 1 leveling, class 1 field size and class 1 gradient. Should not such land be reduced to class 2? It was finally concluded that not many such areas would occur, and that where they were encountered the classifier should decide on the final class according to his best judgment and adjust the symbols on the factor which seemed to be nearest the margin. This was admittedly a compromise, but it seemed better to do this than to complicate the classification scheme with special rules to cover marginal cases.

The entire analysis may be compared to an algebraic equation. The conclusions state, in effect, that if X equals 2 and Y equals 2, then X equals Y and X plus Y equals 4. The results of the study cannot be challenged once the validity of the assumptions as to the values for X and Y is accepted. However, some of the values for X and Y may not be correct; it cannot be proved, for example, that alfalfa yields on class 2 soil will be equal to those on class 3 levelling,

[12] It is obvious, however, that drainage costs will affect project feasibility, because the payment capacity may not be enough to meet all reimbursable project costs if the cost of drainage is too high.

as was assumed in the analysis. In addition, the individual farmer has no assurance that the money spent for land development will be added *in toto* to the sale value of the land, yet the expenditure of this money is necessary in order to use the land properly. A great deal more information is needed on which to base assumptions for making up comparative budgets. Some of the questions for which the answers are considered inadequate are: How much does soil texture affect the cost of plowing, cultivating, and irrigating? Were the labor requirements for the factors of field size and gradient properly evaluated?[13] Should the size of the farm and of the livestock enterprise have been kept constant for each factor? Are the four factors cumulative in their effect on payment capacity, or are there some complementary relationships which were not recognized? Is five percent of the estimated development cost sufficient to attract enough capital to put the land in proper shape for irrigation? What must be considered in setting up special standards for classifying land for sprinkler irrigation? When better answers to these questions, and many other similar ones, are available, the analysis will probably have to be repeated. In the meantime, however, economists and other agricultural technicians must assume a position of leadership in the search for better answers. They should solicit the aid of all the research forces available, and in some instances should recommend that the Bureau of Reclamation provide financial assistance for such research.

Another improvement in the land classification scheme started recently in the Missouri Souris District is the systematic review of the final irrigable area to eliminate isolated areas too small to be practical for the average farmer to operate. The Reclamation Manual provides for the elimination of these small areas, but until recently there was no system for making sure that uniform methods were used. In addition, the irrigation and drainage system is not designed until the arable area is known, hence ditches and drains may cause more small isolated areas than those recognized in the original classification. The system devised consists of a review by a committee which examines the classification after the locations of the canals, laterals, and drains are placed on the classification map.

[13] Recent work done by economists working on the Missouri-Oahe Division in South Dakota indicate that where small fields and steep slopes occur in combination the effect on labor requirements are not cumulative, as was assumed in this analysis. This suggests a re-evaluation of the standards where combinations of gradient and field size occur.

The criteria used are size of the area, land class, distance from water supply, difficulty of construction to serve the area, and the effect on dry land use. In general, any parcel of five acres or less which is isolated from the water supply is eliminated. Ownership lines and, in some cases, section lines are included in the factors which cause isolation. A final evaluation of the size of field factor on all affected fields is made also, because by definition, a field of five to eight acres is class 2, a field of two to five acres is class 3, and a field less than two acres is class 6. This review eliminated many small tracts, the inclusion of which would likely cause farmers to object to the classification scheme on the grounds that it would not be practical. The effect on acreage and total repayment is negligible, but that on the good will of the farmers makes the review well worth while.

The role of the economist in future classification work depends on the purpose of the classification. If the prime purpose is to be repayment, then economists must continue to examine the classification standards and their application to make sure that the finished product properly reflects real differences in the payment capacity of the land. The users of land classification must recognize that as the reclamation program progresses, the operation and maintenance costs will increase in proportion to the reimbursable construction costs, and they must be prepared to take an aggressive stand in insisting that the Bureau of Reclamation actively sponsor state and federal legislation to permit these costs to be varied according to land class.

To be honest in the analyses of payment capacity, it must be recognized that within a given climatic area with similar market opportunities the payment capacity is uniform. Then the adoption of a uniform water payment by land class for all projects within that area should be urged. The total payments for water for class 3 land in central South Dakota might be higher than for class 3 in northern North Dakota because of differences in crop adaptability, but there is no economic justification for a charge of $4.00 per acre for class 2 land on Unit A when Unit B just a few miles away pays only $3.00 for exactly the same kind of land and the same amount of water. The only way such a difference in repayment can be justified is by introducing into the classification scheme some features which now have no legal authorization.[14] It would be possible, for

[14] The examples cited are hypothetical cases.

example, to classify farm units as was done by the old Survey and Adjustment Boards, and include size as one of the factors determining the final farm class. If this were done, however, it would introduce the problem of how to evaluate the dry land associated with the irrigable land and how to provide the legal mechanism for tying the two together. It would be possible, theoretically, to go another step and classify climate and the market adaptability of crops along with the land and the size of farm, thus developing a single set of repayment values by class which would apply Bureau-wide. However, the adoption of either of these plans would raise other problems just as knotty as those we face today, and would require a great deal of careful research to devise equitable means for applying them.

Throughout this presentation the emphasis is on repayment as the principal purpose of classification. Let me hasten to add that there are other uses for the classification data, most of which are used to varying degrees. On all modern projects the end product of the classification, the final irrigable area, is used as the basis for establishing capacities of all the canals, laterals, structures, and other engineering features. Classification data are used to determine the water requirements of different kinds of soil, and are essential for an adequate estimate of deep percolation losses and drainage needs. On public land projects the class of land is used to establish the size of the farm units, and on other projects for recommendations as to farm size. It also forms the basis for recommendations as to proper land use and irrigation practices. Classification material is used in preparing the analysis of benefits, which leads, in turn, to the economic justification report required for the project authorization.

The use of land classification material to advise and instruct new settlers in the art and science of irrigation has been extensive on some projects, but negligible on others. On the Columbia Basin Project, for example, maps are on sale for a nominal sum for each section containing irrigable land. These maps show the contour lines the land class boundaries, logs of the soil profile for each test hole, and a tabulation of the arable land in each 40-acre tract. The availability of these maps is advertised throughout the area, and all prospective settlers are urged to examine them before buying land. On some projects the details of classification are not readily available to the landowners or even to the officials of the irrigation dis-

trict. If the land classification is to be used for purposes other than planning project repayment, then every effort must be made to see that this information is available to farmers on the project and is used to the utmost. Such a program would greatly enhance the success of the unit, and would contribute materially to the ease with which water charges could be collected.

Finally, the land classification should form the basis for project authorization. This is now required by Reclamation Law and Bureau of Reclamation policy, but pressures are often applied to get special authorization in advance of a competent land classification. Such pressures should not go unchallenged. Good land is the foundation on which sound reclamation projects are built, and without such land no irrigation project can be of value either to the farmers on the project, to the communities adjacent, or to the nation as a whole.

THE POLITICS OF AGRICULTURE IN THE UNITED STATES

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AN APPRAISAL of the political significance of American agriculture requires an initial warning. American agriculture is extremely diverse. Some 27 million persons live on nearly six million farms, the census tells us. But these people are spread throughout the United States, vary widely in resources commanded and goods produced, and belong to three general farm organizations and a host of commodity groups—or belong to none at all. Sometimes farm organizations quarrel with each other and have serious internal difficulties. Clashes of economic interest are frequent—between dairy farmers and producers of vegetable oils for margarine, within the ranks of dairy farmers as to who may produce for the urban fresh whole milk market, between ranchers and cattle feeders, between corn-hog farmers and dairy producers for feed, among cotton growers in South Carolina and Texas and California.

Much the same can be said for "industry" or "labor," or for Congress, or the administration. For example, What was the administration's policy toward business combination in June, 1950? The Federal Trade Commission, the Justice Department, and the Commerce Department exhibited a remarkable range of attitudes on the subject! Yet, with proper caution, we can refer to agriculture in politics—as well as to these other groups and institutions.

Why does it make sense to talk about the political significance of American agriculture? The primary reason is that the bulk of commercial farmers agree in principle that government should support farm prices, taking almost any measures necessary to that end, and that also it should help farmers economically in other ways. Further, this agreement is manifested in a willingness to act, and in the creation of strong farm organizations able to influence government. The significance of farmers in politics, given this fundamental agreement among them, is further underlined by the favorable political position of farmers and their representatives in our governmental institutions. The upshot is that government has been pushed—and has pushed itself—far into providing services, credit, commodity loans, market regulation, and production con-

trol in and for agriculture. Government has gone further in promoting, supporting, and regulating agriculture than any other sector of the political economy in peacetime.

Therefore we must ask, what is the significance of agriculture in the American political process? What is the meaning of farm politics for elections, political parties, the role of Congress, the development of presidential leadership? Further, what consequences has agricultural politics for the scope and content of public policy? And what does all this mean for our major answers to the perennial problem of organizing and controlling political power—the separation of powers and the federal system?

The following cursory discussion is based on general study of agriculture in Congress, in elections, etc. It relies heavily upon interpretations of positions of various spokesmen, particularly in farm organizations, and chiefly in the American Farm Bureau Federation. For much of what follows special exceptions would have to be taken for the formal position of the National Farmers' Union leadership. Brevity compels this emphasis upon the Farm Bureau, but accurate appraisal of general political influence also vindicates it. With approximately 1.5 million memberships, the AFBF is the most potent single force in American agricultural policy outside the government. With the exception of the Mountain States, the Pacific Northwest, three or four Great Plains States, and Missouri, the Farm Bureau is politically the most significant general farm organization. Indeed, the chief challenge outside the government itself that the Farm Bureau faces comes not from other general farm organizations so much as from commodity groups, such as the National Cooperative Milk Producers Federation (probably the second most significant farm organization, politically speaking), the Cotton Council, the newly formed Wheat Association, the livestock associations, and a number of extremely influential but narrowly-centered groups such as the California Fruit Growers Exchange.

Agriculture and the Electorate

Farmers are declining in numbers. In 1900 perhaps 35 percent of the entire population would have been classified as rural farm. Today this class has fallen to about 18 percent. By 1970, if total population is 170 millions and rural farm has dropped to 24 millions, the percentage will be only 14. But commercial farmers—those

effective in politics if (for the moment) we consider politics to determine who gets what, when, and where—are considerably fewer. In 1945, one third of the farms produced 80 percent of the total value of farm goods sold, traded, or used on the farm. About nine million persons on two million farms were the primary beneficiaries of agricultural policy. If no decline in their numbers takes place, such farmers may well be only five or six percent of the population by 1970.

The incontrovertible past decline in the proportion of farmers, as well as the hardly less certain future decline, has great political significance. Separation of commercial farmers from subsistence, part-time, and other non-commercial farmers is less easy to appraise politically. Considerable evidence supports the conclusion that government agricultural policy in price support, in commodity loans, in market regulation, in research and extension, in soil conservation, and in governmental credit is largely designed and administered for the benefit of commercial farmers. Secretary Brannan has acknowledged that his plan would not appreciably benefit low-income farmers; he and Allan Kline, President of the American Farm Bureau Federation (AFBF), are agreed on one thing: the high priority of the low income farmer on the agenda of agricultural policy.

But what is the political significance of this discrimination? Are low-income farmers a separate force to be reckoned with in elections? Not so far. The bulk of low-income farmers are in the South, where traditional voting behavior, the one-party situation, the poll-tax, and the racial problem have prevented the emergence of this group as a separate force in the electorate. Nor are low-income farmers an effective separate political force in middle-western elections. What, then, about organization? Low-income farmers as such have no effective pressure groups at present.

My conclusion is that the distinction between commercial and non-commercial farmers has not been politically significant so far as elections are concerned. It might become so if enough people of influence outside agriculture become aware of it. It might become so if politicians estimated that rather drastic changes might be made in some farm programs without more than a relatively small fraction of farmers feeling that they were hurt. For example, I think that the entire agricultural conservation program appropriation of some $250 million could be eliminated—if the Produc-

tion and Marketing Administration's farmer committees were retained—without serious repercussions at the polls. But this statement rests upon the doubtful assumption that such action could be taken with our present political institutions.

Setting economic divisions among farmers aside, What is the significance of the relative decline of farmers in the total population? This decline must be appraised in recognition of what appears to be a secular trend of increasing electoral participation. From 1912 through 1940 a consistent, if highly uneven, increase in those voting for the Presidency occurred. It may well mean that agriculture's numbers are declining at the same time that the general interest in elections is increasing.

What are the political effects? One is that some agricultural leaders are favoring a "republican" system against a "democratic" one.[1] Elections as means of guiding governmental policy are depreciated. They are stressed, and especially primary elections, in order that the ablest representatives will be nominated and elected —representatives who, in the name of their constituents and in keeping with the theory of republicanism, will undertake policy formation and the review of administration. A second and closely related effect is the denial of the mandate theory—more precisely the theory of an electoral mandate to a victorious party. A third effect is less easy to set forth but is, I think, most important of all. This is that the agricultural theory largely deprives the voter of sharing in the difficult moral choices which confront society. The voter is charged with finding a "good" man to represent him, hopefully a decent, honest, and intelligent man. But since farm leaders who espouse this theory are clear that elections should not as such directly influence policy, they must conclude against the need for voters to participate in the grave moral choices of politics which reproduce in the community those serious personal and family moral choices which infuse life with its peculiar human quality.

Agriculture and the Parties, Congress, and the President

Agriculture, to repeat, has the political effect of depreciating political parties as significant instruments in the policy-making

[1] As ensuing discussion indicates, "republican" and "democratic" here refer to different political theories. The first expresses a preference for representative government in which, ideally, elected representatives, mindful of the interests of their constituents, still govern the country according to their best judgment. The second emphasizes elections as giving at least broad directives to the winning party. The terms should not be confused with the names of the major political parties.

and administering process. Farmers are extraordinarily loyal to their parties. In the South, farmers are overwhelmingly Democratic; elsewhere most of them ordinarily vote Republican. Farm organizations, and especially the Farm Bureau, have members of both faiths; farm supporters in the Congress are of both parties. The consequence is that agricultural policy must be hammered out, both within farm organizations and the Congress, on a bipartisan or non-partisan basis. This fact means also that farm politics opposes party solidarity and, therefore, party responsibility. Again we are thrust back to the underlying (and none too well articulated) political theory of agricultural leaders: this is a republican form of government in which legislatures lay down policy, and scrutinize administration, advised and assisted by farmers themselves, through their organizational spokesmen—such as leaders of the Farm Bureau, the Grange, or the National Cooperative Milk Producers Federation.

The bipartisanship of agriculture can be illustrated in the Congress. For example, the 55 Senators in the "farm bloc" during its heyday in 1921 included 28 Republicans and 27 Democrats. When the House passed the McNary-Haugen Bill in 1927 (forerunner of the agricultural adjustment legislation of 1933 and subsequent years), those favoring the measure included 101 Republicans and 100 Democrats. In an important House of Representatives vote on the level of wartime price controls on agricultural products (1942) 105 Democrats and 99 Republicans joined forces. When Senator Anderson's bill was accepted by 45 to 23 in 1949, the majority comprised 23 Democratic and 22 Republican Senators.

Agricultural spokesmen favor the Congress as against the President. Allan Kline told the American Farm Bureau Federation convention in 1948:

> "Freedom is not guaranteed by powerful Executives. That . . . would be freedom by sufferance. Its name is benevolent dictatorship. It is not freedom at all. Insofar as freedom is guaranteed by a political system, it is guaranteed by legislative bodies, elected by and freely responsible to the citizens. True freedom is freedom under law."

Mr. Coolidge's vetoes of farm relief legislation in the 1920's convinced many farm leaders that the Presidency favored the businessman against the farmer. President F. D. Roosevelt was extremely popular with farm leaders in the early New Deal; but apparently for a combination of reasons, these same leaders became suspicious

of the President late in the 1930's. Since this time, organized agriculture has tended to distrust the President as overly favorable to organized labor. The distrust of the President carries over to the Secretary of Agriculture, who is conceived to be "the President's man." Every Secretary since Henry C. Wallace (1921–1923) has suffered somewhat from this attitude. The friction between the Farm Bureau and Secretary Brannan is only the sharpest example of a characteristic tendency. Further, farm organizations frequently advocate major re-workings of agricultural administration to "take farm programs out of politics" by vesting major farm policy decisions in non-partisan boards drawn (naturally enough!) from the organizations themselves. One might cite the Farm Bureau's 1940 proposals as well as frequent programs of the Grange and the National Cooperative Milk Producers Federation. Similarly, the Farm Bureau condemned the President's 1950 reorganization plan for the Department of Agriculture as vesting undue amounts of power in the Secretary of Agriculture.

Political analysis indicates, I think, that farm leaders are wrong in emphasizing Congress above the parties, the electorate, and the Presidency with respect to *emergent* developments in methods of forming policy. But the farm leaders' position squares with analyses of agriculture's *immediate* interests and *present* strength. Two Senators for each state regardless of its population exaggerates farm influence in the Senate. Allocation of Representative seats among geographical districts within states likewise creates disproportionate representation in favor of rural and small town America in the House. The continuous migration from farms to cities makes each reapportionment progressively uneven, at best. More important, state legislatures which make apportionments within the states are commonly dominated by rural and small town voters. Legislators often discriminate against metropolitan areas in assigning Congressional seats. From all this it is obvious that agriculture finds its main support in the Congress.

Agriculture and the Balance of Power

For a century or more, partisan strategy in this country could be interpreted as the art of successfully uniting two or three great geographical sections in a winning combination. A. N. Holcombe's thesis has been that agricultural sections, primarily the grain-growing Middle West, held the balance of power between the two

major parties for many decades, but that the growth of metropolitan centers had, by the 1930's, induced a change. Pointing to the significance of the metropolitan vote, he discerned a new balance of power shared by rural and urban "middle classes."

At all events, what happens in rural America seems increasingly less significant in answering the question: Who controls the Congress and the Presidency? Indeed, in 1942 the Democrats lost every rural farm seat north of the Ohio River and on west through the corn and wheat belts as far as Montana, with the exception of three seats in southeastern Missouri, yet the Democrats organized the House of Representatives in the 78th Congress. This suggests that, while rural midwestern districts were contributory, they were by no means decisive in the Republican victories of 1946 and 1948. In the states of Ohio and Michigan and thence west to the Dakotas and south through Kansas, there are 58 Congressional seats which on the 1940 census appeared more than 50 percent rural. Republicans held all these seats in the 80th Congress. In 1948, the Democrats managed to win only ten of these seats, four of them in Missouri; yet the 81st Congress convened with 263 Democrats against 171 Republicans. Had the Democrats made no midwestern farm gains, they would still have enjoyed a majority of 72!

Similarly, middlewestern agriculture contributed to President Truman's victory in 1948 but was hardly decisive. Yet the willingness of many midwestern farmers in Kansas, Nebraska, Iowa, Minnesota, and Wisconsin to swing toward a Democratic President while continuing to support Republican Congressmen suggests two points. The first is that the rural vote remains a factor of some significance in the balance of power in presidential elections.[2] Midwestern farmers have demonstrated some ability to shift back and forth. One shift does not entitle a group of voters to be considered in the balance of power. By shifting Democratic in 1932 and 1936, returning to the Republicans in 1938, but shifting *toward* the Democrats in 1948, midwestern farmers have demonstrated a degree of political independence which makes them something of a factor in presidential politics. The 1948 shift of Iowa farmers to-

[2] Louis Bean declares the farmers to have been "primarily responsible for electing Truman" in 1948. "Forecasting the 1950 Elections," *Harpers Magazine*, April, 1950. Contrast Samuel J. Eldersveld, "The Influence of Metropolitan Party Pluralities in Presidential Elections Since 1920," XLIII, *American Political Science Review*, No. 6 (1949), p. 1189. My own conclusions rest, in part, upon an analysis of the vote in 80 "rural" counties in eight midwestern states, made by members of my class in *The Politics of Agriculture*, Autumn, 1949.

ward Mr. Truman, for example, did not carry the state; but it helped, and that is important. Second, the tendency for numerous midwestern farmers in 1948 to vote for a Democratic President even though they persisted in supporting Republican Congressmen should give pause to those farm leaders who insist upon elevating the Congress above the Presidency in the political process.

Nevertheless, the logic of farm leaders remains sound. In view of the favorable representation of agriculture in Congress, the legislative branch of government is the natural organ of rural purposes and the natural bastion of defense for rural interests. Further, the decline of significance of rural voters in the electoral balance of power indicates that a sound analysis *of the immediate interests* of agriculture underlies the depreciation of political parties and the electorate as policy-making forces in American politics.

Agriculture, Administration, and Farm Organizations

Logically, we should now examine the effect of agricultural political demands on the purposes of government and judicial review, the process by which the imprimatur of the Supreme Court is eventually placed upon expansions of the scope and changes of the content of public policy. It must suffice to say that agricultural demands for research and education, for market regulation, for public credit, and eventually for price stabilization and aid in conserving and developing agricultural resources have markedly changed the character of governmental action in the United States —and the Supreme Court has acquiesced.

These changes have required large expansions in administration. The United States Department of Agriculture, with about 1000 employees in 1900, had in 1940 (the high point) some 94,000 employees and some 270,000 persons "cooperating or collaborating but not paid by the Department. . . ." We have here tremendous administrative development, two aspects of which stand forth as quite significant for the organization and distribution of political power.

The first of these aspects is in the administration of agricultural price supports and production control, wherein community and county committees (elected locally by cooperating farmers) handle the program at the farm level. These committees are geared into an administrative system which includes state committees and the Production and Marketing Administration in the Department at

Washington; further, there is a fairly well marked system of promotion from the ranks so that numerous Washington officials are farmers who began their public careers in community or county committee posts from which they have been moved up the line. How far? Two have become Undersecretaries of Agriculture and one attained the secretaryship itself—all since 1940.

The Production and Marketing Administration, the core of which is farmer bureaucracy, administers—and stress this well—*the farm program*. Of course, the agenda of agricultural policy is a long one. Every item on it is of intense interest to one or more groups; but everyone and every organization concerned with agricultural policy are vitally and continuously interested in the price support and production control program for agriculture. While virtually all those directly interested agree on the need for *a* price program, differences are sharp and abiding as to *what* the program should be and *how* it should be administered.

Now this price program embodies economic justice for the farmer —and the concrete, here, now, dollars-in-the-pocket variety of justice. It follows that every argument as to levels or methods of price supports or of techniques of their administration involves moral considerations and emotional reactions respecting what is justice. It follows that the farmer administrators of the program are members of an administrative organization which creates its *esprit de corps* out of its service to the farmers in pursuit of justice. This is the farmers' program; its aim is a fair deal for farmers; it was designed by farmers; it is accepted by farmers through referenda and is administered by farmers whose positions rest, in the communities and counties, on the strong democratic justification of elections. In short, we have here an administrative agency which is also a pressure group, but, more than this, which rests firmly on local elections and which is charged with achieving economic justice for the farmer. Many will say that the above is exaggerated, that I have elevated tendencies into realities and compressed and sharpened the focus at the expense of essential details which, if included, would fundamentally change the picture. But, differences of interpretation aside, I believe that the foregoing suggests that the primary recent development of administration for major agricultural policy in the United States is fraught with political significance.

The second aspect of agricultural administrative development

which has political significance has really two facets. The first of these is the extensive degree of interlocking agricultural administration with organized pressure groups. This is true of the Forest Service, of the Soil Conservation Services of the National Association of Soil Conservation Districts, of the Rural Electrification Administration and the National Association of Rural Electric Cooperatives, and of the Extension Service and the Colleges of Agriculture in many states and the Farm Bureau. The second facet is that this interlocking or development of mutual interdependence of administrative agencies and private groups has important political decentralizing effects.

Agriculture, and the Separation of Powers, and the Federal System

We are now ready to appraise the significance of the politics of these forces for the following major characteristics of the United States' political system. The constitution declares and political institutions create an effective separation of powers (a) at the seat of the national government and (b) between the national government and the states.

The politics of agriculture is probably chiefly significant in sharpening the separation of powers in the national government. Their interpretation of the interests of agriculture impels its leaders to support the Congress against the President. Division among the farmers and their extraordinary loyalties to their political parties likewise compel agricultural policy to be made in bi-partisan or non-partisan fashion and encourage agricultural leaders to deplore any effort to introduce partisan politics into agricultural policy. These statements are vindicated by the nearly unanimous stand of organized agriculture, except the National Farmers' Union, against the Brannan Plan and against the entrance of the Democratic Party into farm policy making. This political position of agriculture lends support to efforts to reorganize Congress insofar as these efforts strengthen Congress against the President. But farm politics helps prevent the development of partisan legislative policy committees of the sort widely proposed by political scientists to bridge the legislative-executive gap. Agriculture's position likewise hinders efforts to consolidate and integrate the executive and legislative powers of the President. Agriculture's position will further militate against efforts to induce party discipline and create party responsibility, by whatever devices.

Agriculture's position, to repeat, is that agricultural policy should continue to be made within agriculture—which includes farm organizations, administrative agencies concerned, and farm Congressmen. This view implies a process of group and sectional compromise which is *not* worked out within the framework of political parties. This situation, the political strength of organized agriculture being very great, certainly adds to the strain and stress under which our general political institutions operate. Similarly, it adds to the strain and stress within agricultural politics. I have already noted that the insistence of agricultural leaders on the pre-eminence of Congress may be incompatible with the tendency of farmers themselves to look to the President in time of need—and surely is inconsistent with the major political development in the modern United States: the ever-increasing stature of the presidency. Further, the vaunted group and sectional compromise may be breaking down as a means of formulating agricultural policy. In view of the remarkable achievements of farm groups and Congressmen in compromising the cotton program in 1949, one must say this very tentatively. Yet note that in both 1948 and 1949 internal differences of agriculture delayed passage of major farm legislation until the closing hours of Congressional sessions—and then dictated that the most important features of the *status quo* (the 90 percent support level for basic crops) be retained one more year. Consider further that the coming reapportionment of Congress is bound to weaken agriculture's strength in that body. And then ask: How long can agriculture maintain its position that farm policy should be worked out essentially by the farmers' representatives in Congress and in farm organizations?

Turning now to federalism: What has been the consequence of the politics of agriculture for the federal-state division of powers? Here the consequences are so varied as to defy hasty summarization. It is obvious that farm pressure has secured vast expansions of national public policy for agriculture and administrative agencies necessary thereto. Certainly the expectations of this generation of farmers have been strongly centered upon Washington. These are significant nationalizing tendencies. Contrarily, much agricultural policy previous to the New Deal—and even since its advent—has strengthened state agricultural agencies, primarily the colleges of agriculture, the experiment stations and the extension services. This development has been paralleled by the emergence of the state Farm Bureaus which are federated into the powerful Ameri-

can Farm Bureau Federation. In at least half the states, agricultural extension workers have significantly contributed at one time or another to the growth of the Farm Bureau. Hence the development of agricultural policy has also vested great strength in state agencies and farm organizations which can and do marshal considerable strength to pressure for the political decentralization of agricultural administration. Thus agricultural politics works to strengthen both the federal government and the states.

Concluding Remarks

The foregoing analysis suggests that the politics of agriculture enlarges the gulf between the President and Congress. At the same time, farm pressure has forced a significant expansion in the scope and marked changes in the content of public policy. These two consequences of farm politics are mutually significant. That is, the inherent opposition of President and Congress, which the political action of agriculture aggravates, would be far less grave if government had not been pushed into the radically extended programs of the present. Put another way, farm politics helps expand the functions of government until a thoroughly integrated process of policy formation becomes essential; yet farm politics works to make this integration extraordinarily difficult. Thus the maintenance of domestic agricultural programs may hinder the prosecution of an economic foreign policy based on the present position of the United States as a creditor nation. The need is for integrated policy formation in which the consequences of policy in one area are weighed for their effects elsewhere; yet it is exactly this integrated policy formation against which the politics of agriculture militates.

Organized agriculture should re-examine its reliance upon general farm organizations and its favored position in the Congress in light of the emphasis implied upon the distinctiveness of agriculture, in an era of inevitable contraction for agriculture as a political force. The question is: Does agriculture wish to identify itself as a minority? If so, it must grant other groups the same privilege—and some of these groups are surely destined to be larger and eventually more influential minorities than agriculture. Let me be specific. After the 1946 elections, I heard a powerful farm spokesman declare: "We are now in position to write the major labor legislation for this country." If the tables are turned, will agricul-

ture graciously accept the converse, namely, that organized labor shall write the country's major agricultural legislation?

The upshot of these remarks is to suggest that agriculture wipe its slate of past political analyses and begin the sober and painful process of reappraisal. This reappraisal should fully recognize the emergence of the executive in United States government. It should ask what other role than absolute pre-eminence can be developed for the legislature. It should examine the case for disciplined and responsible parties. It should reappraise the role of pressure groups and of the citizen. And finally it should ask whether an inevitably shrinking, if effectively organized, minority will not find its best protection in a political system that gives greater weight to the majoritarian principle rather than a system that emphasizes strategic minorities to the extent characteristic in the United States of today.

SOME ECONOMIC CHANGES IN FOOD MANUFACTURING

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THE most inclusive view of different phases of food manufacturing in the United States is provided by the Census of Manufactures. The 1947 Census, recently published, reveals some drastic changes in food manufactures since 1939. The following is a brief examination of two somewhat disconnected topics illuminated by census data, namely changes in number and size of plants, and alterations in their productive services.

Changes in Number and Size of Plants

Rapid industrial expansion is usually accompanied by rather marked changes in the organizational pattern of the industry. The output of food manufacturing industries increased about 50 percent during the decade of the forties; changes in individual industries varied widely. It may be instructive to examine briefly the changes in the number and size of plants that occurred during the period.

TABLE I. CHANGES IN NUMBER, SIZE AND OUTPUT OF PLANTS IN MANUFACTURING INDUSTRIES, 1939–1947

Industry	Number of plants	Average size of plants[a]	Total output of plants[b]
		(percentage change)	
Food manufactures	−9.7	61.4	45.7
All manufactures	38.6	10.1	52.6

[a] As measured by production workers per plant.
[b] As measured by total production workers.

Numbers of plants. The total number of food plants decreased 10 percent from 1939 to 1947, an experience contrary to that of other manufacturing sectors of the economy. Plant numbers in total manufacturing increased 39 percent, with increases in individual sectors ranging from 13 percent in petroleum and coal products to 102 percent in machinery products.

However, the over-all change in the food sector hides divergent experiences of individual food industries. Plant numbers decreased

in 15 food industries and increased in 22 others. Reductions of 100 plants or more occurred in the manufacture of bread, butter, flour, natural cheese, ice cream, dressed poultry, malt liquors, cottonseed oil, and macaroni products. Increases of 100 plants or more occurred in the manufacture of soft drinks, meat, processed cheese, candy, canned fruits and vegetables, pickled fruits and vegetables, frozen foods, and flavorings.

Changes in plant numbers mirror the operation of underlying technical and economic forces. An increase in plants may result from an expansion of relevant markets; but within limits existing plants might meet such needs. There are environmental factors, independent of general market expansion, that induce new plants to enter; e.g., population shifts, alterations in sources of materials, transportation changes, improved production machinery, governmental regulations, etc. The withdrawal of older or less fortunately situated plants tends to lag. On the other hand, a decrease in plant numbers may result from a contraction of the market. However, in the period studied most markets for manufactured foods expanded. The explanation for the decrease in plant numbers lies in other directions, probably in the triumph of large-scale over small-scale operations. The food industries are quite sensitive to changes in the economic environment through factors such as product bulk and perishability, in-transit privileges, weight loss and weight gain in processing, etc. It would be of interest, for example, to trace the impact of the recent westward migration of population on the location of food manufactures.

Average size of plants. The average size of plant increased about 60 percent.[1] Behind this average lies a great range: from a decrease of two thirds in processed cheese to a three-fold increase in natural cheese. A large influx of new plants, apparently due to patent expiration, lowered the average size of processed cheese plants. On the other hand, a large number of plants withdrew from natural cheese manufacture, while the output of the industry doubled. This points to favorable conditions in augmenting the milk supplies available to surviving plants.

Both butter and canned milk plants increased in size some 60 to

[1] As measured by the number of production workers per plant. Obviously this indicator relates more closely to the size of operations than to physical capacity.

A change in the average size of plant in an industry tells nothing about changes in the size of individual plants. It requires separate investigation to determine whether small, medium, or large plants changed relatively more.

70 percent, but for opposite reasons. The butter experience reflects almost solely the withdrawal of plants, whereas canned milk reflects solely the expansion of production.

The output of the frozen food industry increased five-fold, and so did plant numbers. The average size of plant did not change. Was this an accident or is there something in the environment of the frozen food industry that limits output adjustments to one dimension, namely, numbers of plants? Other industries in which similar one-dimension adjustments to output changes occurred are pickled fruit and vegetables, cured fish, and canned sea food. Probably many food plants are too small to make efficient use of their resources, or improve product quality. The general trend toward larger plant operations may present opportunities for such improvements. However, under some conditions plants may be too large; e.g., when faced with a sudden shrinkage of materials in the normal supply area. The responsible executives have a nice problem in attempting to balance conflicting considerations when they expand operations.

Perhaps the examples given above are sufficient to indicate the kind of economic considerations suggested by changes in plant size and numbers (Table II). It is a convenient point of departure for speculation about the economic and technical environments of industry.

Changes in Manufacturing Services

Changes in manufacturing services in the food supply are complex. They include all the activities carried out within food plants—the services united around processing operations: handling, storing, conditioning, processing, packaging, packing, record keeping, maintenance, etc. Census data can only furnish ideas about the aggregative changes in manufacturing services.

1. From 1909 to 1949, the net output of food manufacturing plants increased three and three quarter fold.[2] The significance of this expansion may be clearer if a comparison is made between service contributions of feeder and user industries. Over the 40-year period, the average annual growth rate of food manufactures was more than twice the growth rate of farm food production. This

[2] Physical output, net of the materials used in manufacturing. The index is from Solomon Fabricant, *Employment in Manufacturing*, for the 1909 to 1939 period; and from the Federal Reserve Index of Food Manufactures, 1939 to 1949.

large disparity in the growth rates of sequentially related industries suggests that (a) the demand for manufacturing services in the food supply outran that for food nutrients, or/and (b) the cost of pro-

TABLE II. CHANGES IN AVERAGE PLANT SIZE, NUMBERS AND EMPLOYMENT INDIVIDUAL FOOD PROCESSING INDUSTRIES, 1939 TO 1947

Product	Average size	Numbers of plants	Employment
	(Percentage change, 1939 to 1947)		
Natural cheese	231.2	−32.5	123.6
Ice cream	154.2	−15.6	114.3
Malt liquors	142.8	−27.3	76.7
Bread, cake, rolls	128.0	−34.2	50.1
Flour milling	113.8	−42.0	24.0
Prepared flour	109.4	56.4	227.5
Wines	107.5	20.1	149.2
Poultry dressing	85.7	−25.9	37.5
Sausage, N.E.M.	85.2	5.6	95.6
Butter	69.3	−38.5	4.2
Macaroni	60.0	−31.1	10.2
Flavorings	58.8	27.0	101.8
Canned milk	58.7	0.0	58.7
Soft drinks	55.4	24.7	93.8
Chewing gum	52.0	37.0	108.3
Chocolate and cocoa	50.0	−20.5	19.2
Biscuits and crackers	40.0	− 8.4	28.6
Malt	39.4	1.9	42.1
Breakfast cereals	39.3	− 8.6	27.3
Beet sugar	28.4	−12.9	11.8
Oleomargarine	22.4	50.0	83.5
Soybean milling	21.1	183.0	242.7
Cane sugar refining	15.3	− 7.4	6.8
Rice milling	13.9	22.2	39.3
Cottonseed milling	13.4	−29.5	−20.1
Canned fruits and vegetables, preserves	9.2	19.3	30.2
Pickles, salad dressings	2.5	45.4	49.1
Cured fish	1.6	11.4	13.2
Canned sea foods	1.4	18.7	20.3
Leavening compounds	− .8	2.1	1.3
Frozen foods	− .8	377.0	373.0
Shortenings	− 1.0	22.0	20.7
Candy	− 3.1	34.7	30.4
Starch products	− 4.4	57.1	50.2
Meat packing	− 6.1	54.7	45.2
Cane sugar mills	− 9.3	5.1	− 4.6
Vinegar and cider	−12.5	−10.6	−21.8
Processed cheese	−70.6	886.2	190.2

Based on the Census of Manufactures.

viding additional manufacturing services decreased relative to that of furnishing more food nutrients. While this is a matter for investigation, it would appear that the demand changes were the more important.

The expansion of food manufactures occurred through several avenues. First, there has been an increase in the proportion of the food supply passing through factory processing. One evidence is the shifting of certain operations from households and retail shops to factories; another evidence is the tendency to extend manufacturing in areas where little or none existed; e.g., frozen and dried eggs, frozen vegetables, canned citrus juices, potato chips, canned baby foods, etc.

Second, there were shifts to the types of food that have high processing requirements. Compare the increased output of prepared and canned meats relative to livestock slaughter, bakery goods and prepared flour mixes in relation to flour production, processed cheese to natural cheese, ice cream to butter, soft drinks and flavorings to sugar, canned beer to keg beer. Third, apart from the shifts just noted, there has been a tendency to expand manufacturing services in foods generally; e.g., note improvements in whole milk, cheese, margarine, shortenings, lard, bacon, bread, etc.

2. A second view of changes in manufacturing services is according to farm commodity groups. Thirty-eight census industries were classified into seven commodity groups and their relative outputs determined in selected years. The changes in composition of output are recorded in Table III.

A value measure of output is used here. Value added by manufacture is the difference between the factory value of the output and the costs of materials and supplies. Presumably it roughly measures the sum of payments for the use of labor, capital, and entrepreneurship devoted to the manufacturing enterprise, or the

TABLE III. CHANGES IN COMPOSITION OF OUTPUT IN FOOD MANUFACTURES
(Value added basis)

Commodity group	Net change in percentage contribution to total value added in food manufactures			
	1914 to 1947	1914 to 1927	1927 to 1939	1939 to 1947
Livestock	−5.40	−5.54	− .14	.28
Grain	−7.31	.15	−2.15	−5.31
Oilseeds	1.09	−1.49	− .07	2.65
Fruits & vegetables	3.81	1.06	1.50	1.25
Milk & cream	2.58	4.61	−2.35	.32
Sugar crops & cocoa beans	1.76	.90	3.47	−2.61
Other	3.47	.27	− .25	3.45

value measure of services. Relative shifts in the contributions of different industries to the value added by manufacturing may reflect relative shifts in services provided or/and those in the price of such services (margins).

Manufacturing industries in the livestock and grain groups yielded to those in oilseeds, fruits and vegetables, milk and cream, sugar crops and cocoa beans, and miscellaneous commodity groups in the 1914 to 1947 period. These shifts may mean that (a) relatively less livestock and less grain were processed in 1947 than in 1914, (b) or the quantity of manufacturing services per unit of livestock and grain inputs declined, relatively, (c) or the margins in livestock and grain declined relatively. Probably the causes are mixed and a complete explanation would involve all three considerations.

Some of the changes shown in Table III are explainable by changes in food consumption. The results are consistent with the secular increase in consumption of fruits, vegetables, and dairy products relative to grain and meat. But relative changes in the intensity of manufacturing different commodities are not as readily apparent without extensive investigation.

Also it is quite difficult to determine the relative changes in the prices for processing services. Although such differences no doubt are important they probably are less significant than those in the quantitative aspects of services in explaining the relative changes in value added by the various food manufacturing industries.[3]

[3] This statement is supported in a general way by Dr. Fabricant's investigations. See *Output of Manufacturing Industries*, pp. 145–151.

FARM HOUSING IN THE UNITED STATES AND RECENT FARM HOUSING LEGISLATION*

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FARM housing, the ugly duckling of the housing field, finally came into its own with the passage of the Housing Act of 1949.[1] The $280 million authorized for farm housing loans and grants under this Act represents the first financing program in the history of United States agricultural legislation specifically aimed at improving farm housing. The Housing Act was an omnibus statute, enunciating a policy of the responsibility of the Federal Government to aid the attempts of every American family to obtain "a decent home."[2] It provides financial assistance to local communities for such purposes as slum clearance, land redevelopment, and low rental housing construction. The portion that concerns us here, Title V, makes available through the Farmers Home Administration financial and technical assistance to farm owners to provide themselves and their tenants with decent and adequate housing and farm buildings.

The purpose of this paper is to sketch the background against which developed the farm housing provisions of the Housing Act. The nature and extent of our information on farm housing, the major factors which have influenced its development, and past governmental action in this field will be summarized. How various economic, regional, and other policy considerations bore upon the framing of the farm housing provisions will be reviewed. And, finally, an evaluation will be essayed of the probable accomplishments of these provisions.

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* Material drawn from congressional committee hearings on housing will be cited in the following manner: *80 House 1941, 953–957:* U. S. 80th Congress, House Committee on Currency and Banking, "Housing Hearings," 1948, pp. 953–957; *80 Joint 1948:* U. S. 80th Congress, Senate-House Joint Committee on Housing, "Housing Hearings," 1948.

** The author is indebted to Prof. F. F. Hill, Department of Agricultural Economics, Cornell University, for material assistance in preparing this study for publication.

[1] Public Law 171, 81st Congress, First Session.

[2] *Ibid.*, Section 2.

Historical Background

Farm Housing Surveys

The first attempt to determine the status of American farm housing was made in 1929 by Kirkpatrick, who used data from the 1920 Census and from scattered surveys conducted during the 1920's.[3] Succeeding national surveys broadened the scope of investigation and provided additional details. The first major report thus based was issued in 1932 under the auspices of the President's Conference on Home Building and Home Ownership.[4] The influence of income, credit, and technical knowledge on farm housing, and the relation of farm housing to health, welfare, and the individual farm economy were stressed.

The U. S. Department of Agriculture surveyed 595,000 farm homes in 1934 in an 8.6 percent sample of all occupied farm dwellings.[5] Estimates of housing adequacy were presented for the nation as a whole and by geographic regions.

The National Consumer Purchases study of the Departments of Agriculture and Labor in 1935–1936 sampled over 16,000 farm families in all parts of the United States except the Southwest.[6] This sample also included families in small cities and villages; the influence of degree of urbanization on housing was studied as well as that of income. Other national studies include those of the Bureau of the Census in 1947,[7] and various analyses of Census data for 1930 and 1940 dealing with farm housing.

The following facts have emerged from these studies:

(1) The level of housing of America's farm families, considered as a group, compares unfavorably with urban housing. This is particularly true in regard to such facilities as running water, central heating, electricity and sanitary toilets.[8]

(2) Quality of housing is associated with level of income.

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[3] Kirkpatrick, E. L., *The Farmer's Standard of Living*, Century Co. N. Y., 1929, pp. 129–137.

[4] Committee on Farm and Village Housing, *Farm and Village Housing*, Report to the President's Conference on Home Building and Home Ownership, vol. VII, Washington, 1932.

[5] Bureau of Home Economics, *The Farm Housing Survey*, U.S.D.A., Misc. Publ. 323, 1939.

[6] Kyrk, Hazel, et al., *Farm Housing and Facilities: Five Regions*, U.S.D.A. Consumer Purchases Study, Misc. Publ. 399, 1940.

[7] Cited by Smith, R. C., Assistant Chief, Bureau of Agricultural Economics, 81 Senate 1949, 206–207.

[8] Recent pertinent data are presented by Burroughs, Roy J., "Toward a Farm Housing Policy," *Land Economics* 24, Feb. 1948, pp. 2–4.

(3) Owner-operators usually have better homes than tenants.
(4) Sharp regional differences occur in the quality and adequacy of farm housing. New England and the West Coast have the best farm housing while the South has the poorest.
(5) Rapid progress has been made during the last two decades in improving some aspects of farm housing—electrification, for example.

Factors Affecting Farm Housing Development

Levels of housing[9] in urban and rural areas definitely parted company in the last century as cities increased in size and amassed wealth. Considerations of health demanded sanitary safeguards and mass markets provided the incentive for the development of such local utilities as water, electricity, and gas. The overwhelming proportion of urban residents have long enjoyed these services, whereas relatively few farm houses had electricity or running water as late as the 1930's.

In rural areas, the predominant force influencing the levels of farm housing has been sharply fluctuating and frequently inadequate farm income. The farmer traditionally has financed home improvements from current income, while he characteristically finances the purchase of land and machinery by debt. Even when farm incomes are relatively high, he frequently prefers first to reduce his mortgage debt rather than modernize the kitchen or install running water. The tendency to capitalize enlarged farm earnings into increased land values has further reduced the possible beneficial effects of better income on farm housing. Farm housing, like other sectors of the farmer's level of living, cannot keep pace with higher income if debt service charges on higher land values absorb large proportions of the increased income.

Not only are actual levels of farm housing lower than urban housing, but the "standards" of what constitutes good housing are apparently also lower; and this probably has contributed in turn to the low current levels in existence. Emphasis on the farm business in the life of the farm family is expressed in the maxim that "A house never built a barn, but a barn will build a house." Extension workers and rural sociologists, in coping with this problem,

[9] "Level of housing" refers to actual physical status while "standard of housing" refers to the psychological norm, i.e. what is considered desirable.

have been "breeding discontent" among, primarily, the farm home-makers, with the end in view of "instilling into the hearts and minds of farm families an urgent desire for better homes."[10]

Farm family dispersion naturally has resulted in a scarcity in rural areas of trained and experienced specialists in home construction. Until recently no public agencies adequately filled this gap with advice and plans for farm homes comparable to those available for the design and building of structures for livestock, grain storage, etc.[11]

The adequacy of credit for farm housing has been sharply debated. The question has been raised, for example, as to whether all "good" risks can obtain credit to finance needed housing improvement. It is argued that repayment plans presently in effect do not meet the needs of many potential borrowers who are "good" risks; and that flexible repayment provisions, lower interest rates, and longer payment periods would be economically and socially desirable innovations.

Others argue that all "good" risks can obtain credit from existing cooperative or commercial sources; that flexible repayment plans would be both difficult and costly to administer; and that low interest rates and long-term repayment plans eventually result in higher land values through the capitalization process. Such plans, it is held, necessarily would involve government subsidy.

A third school has contended that many farmers who are poor risks can be converted into "good" risks by the use of supervised credit and temporary subsidies.

The importance of distinguishing between "sound credit" and "unsound credit" or subsidy has been urged by Butz[12] and others.[13] Let it be clear, they have pointed out, that if a subsidy is proposed, repayments will not cover costs; and that subsidy, not credit, is involved. The candid recommendation of a subsidy then may be more truly evaluated on its merits.

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[10] Bruce, Zilpha F., *Contribution of Extension Housing Program to the Social Needs of Rural Families*, Thesis, mimeo, George Washington University, Wash., 1937, p. 37.

[11] Wilbur, Ray Lyman, foreword in *Farm and Village Housing*, 1932, p. ix; also see Rains, Albert, Cong'n., Ala., 81 House 1949, 178; Brown, Julian, Ala. State Director; Farmers Home Admin. 80 Joint 1948, 1320.

[12] Butz, E. L., "Postwar Agricultural Credit Problems and Suggested Adjustments," *this Journal*, XXVII, May 1945, pp. 284–296.

[13] Research Committee, "Federally Sponsored Credit Services to American Agriculture: Suggestions for Improvement and Coordination," *this Journal*, XXIX, Nov. 1947, pp. 1428–1502.

Government Activity in Farm Housing

Government aid to farm housing has a history of some 30 years. Such aid has included programs operating through (1) extension and education, (2) farm income improvement, (3) credit, and (4) subsidies.

During the 1920's the Extension Housing Program functioned chiefly to stimulate in farm families the desire for improved home surroundings; it also provided such families with housing information. Some of the State Experiment Stations developed farm house plans to a limited extent. Since the 1930's the U. S. Department of Agriculture and State agricultural and home economics colleges have, individually and cooperatively, developed and published farm-home plans and designs, setting standards of convenience and livability for the farmhouse, and suggesting ways to meet these standards.[14]

A long list of government programs that need not be listed here have evolved in response to the problem of low farm income. Although benefit to farm housing has not been their explicit goal, it seems reasonable to believe that receipt of various income supplements from the government and from higher market prices bolstered by Federal action has helped increase the ability of farmers to improve their homes.

The Federal Land Banks, established in 1917, represented the major pioneering effort of the Federal Government in providing farm credit. Through the writing of long-term amortized mortgages at low interest rates, they have aided many farmers in equipping new farms and constructing homes and farm buildings.

The Rural Electrification Administration, created in 1935, has provided another and highly specialized form of rural credit. It makes 100 percent self-liquidating loans to local electricity distributors at about two percent for periods up to 35 years. These distributors, typically cooperatives, lend to the farmer-consumer at four percent interest primarily for the purpose of wiring the home and other farm buildings.

The subsidy element has entered into many so-called "loan" or "credit" programs and has taken many forms. Annual Congres-

[14] See Bur. of Agrl. Chem. and Engin.: (1) *Plans for Farm Buildings for Southern States*, U.S.D.A. Misc. Publ. 360, 1940; (2) *Plans of Farm Buildings for Western States*, U.S.D.A Misc. Publ. 319, 1939; both in cooperation with extension service and agricultural engineering and home economics departments of southern and western agricultural colleges.

sional appropriations have subsidized the activities of a number of agencies interested in rural relief and rehabilitation. Training in improved farm and home management under temporary supervision of specialists has been the keystone of their operations, and housing improvement frequently has accompanied this aid. This has ranged from minor repairs on structurally sound farm houses to construction of new homes by the agency. Under the Bankhead-Jones Farm Tenant Act, over 44,000 farm homes have been improved and 15,000 new homes constructed.[15]

Under the U. S. Housing Act of 1937 the creation of local rural housing authorities was sanctioned. By 1946, 34 rural housing authorities in 318 predominantly southern counties and parishes had been locally organized and 505 farm homes built in the states of South Carolina, Georgia, Mississippi and Arkansas. These are individual houses, each located at its respective farm on a one- or two-acre tract to which the local authority holds title and from whom the house is rented. Leases run for 60 years with option to purchase.[16]

Camps for migrant farm labor were built in the late 1930's in the intensive crop areas of such states as California, Texas, and Florida. Government operation of a total of 52 camps was ordered liquidated in 1947.

Farm Provisions of Housing Act of 1949

Urban public housing assistance won wide popular support in the 1930's. Post-World War II thinking about farm housing was influenced by existing urban housing and home finance programs and by experience with previous programs and studies relating to farm housing. Extensive hearings on postwar economic policy in 1944 and 1945 devoted much attention to the current housing picture, and one outgrowth of these hearings was S. 1592 (79th Congress), the Wagner-Ellender-Taft general housing bill. Its farm housing provisions were essentially identical with those of S. 866 (80th Congress) and Title V of the Housing Act of 1949 (81st Congress).

Title V authorizes assistance in dealing with three factors—credit, income and technical advice. For purposes of the Act, a farm

[15] Lasseter, Dillard, Administrator, Farmers' Home Admin. 81 Senate 1949, 221.

[16] Vance, Rupert B. and Blackwell, Gordon W., *New Farm Homes for Old—A Study of Rural Public Housing in the South*, University, Ala., Univ. of Ala. Press, 1946, Ch.1.

is defined as a parcel or parcels of land operated as a unit which customarily produces agricultural products valued at $400 or more at 1944 prices. Persons eligible for assistance are restricted to farm owners in need of adequate farm buildings for themselves or their tenants, who are unable by means of their own income, savings, or credit to provide them.

Section 502 of the Act provides credit for the construction or improvement of dwellings or other buildings on so-called "adequate" farms. Although the Act does not define the term "adequate" it apparently refers to farms which provide a typical family with the opportunity to earn sufficient income from farm and nonfarm sources to repay a housing loan. Eligible applicants may borrow on a 33-year, four percent, amortized repayment plan. Individual loans may not exceed the amount which the applicant may reasonably be expected to repay from the earnings of himself and his family from farm and nonfarm sources. In determining repayment ability consideration is to be given to the maintenance of a reasonable level of family living. Loans are to be secured by the applicant's equity in the farm and such additional security or collateral, if any, as seems necessary to assure repayment. Presumably loans may be secured by junior liens as well as by first mortgages. When a farmer borrower is deemed financially able to do so, he is expected to refinance his loan through a conventional credit source. A moratorium is authorized by Section 505 on the payment of interest and principle when such payment, for reasons beyond the borrower's control, would unduly impair his level of living. In cases of undue hardship the Secretary is authorized to cancel interest which becomes payable during the period of such moratorium. Deficiency judgments may not be taken in connection with foreclosure actions involving loans for which a moratorium has been granted, provided the borrower has done his best to meet his obligations.

Section 503 is intended to enable the farm family on a "potentially adequate" farm to enjoy the benefits of proper housing while in the process of building up the farm business. If an applicant's income is too low to support a loan, it may nevertheless be made provided the applicant adopts a plan of farm improvement or enlargement which, in the opinion of the Secretary, will increase his farm income within a period of five years to a point where he can carry the loan. During the five-year period the Secretary may agree to make annual contributions in the form of credits

on the borrower's indebtedness in an amount not to exceed the annual interest installments and 50 percent of the annual principle payments due on the loan. Such agreements are safeguarded to prevent the benefits of this provision from accruing to ineligible persons.

Section 504 meets the problem of very low family income, with no prospect of increase, by providing for grants or combined loans and grants to families unable to qualify for assistance under Sections 502 and 503, for the purpose of making urgently needed basic home improvements. Such grants are limited to a maximum of $500.

Section 506 aims at reducing the cost of home construction and at improving the quality of technical assistance available to the farmer. This section authorizes technical research in farm housing and requires all buildings and repairs financed under the Act to be of substantial construction.

Policy Attitudes towards Farm Housing

Policy questions, in the course of many committee hearings, took varied forms. Discussion centered in the main on the desirability of the ends sought and on the practicability of the means proposed to reach the objectives. Although it was designed to cope with the three factors considered to be largely responsible for lack of adequate farm housing—low and unstable farm income, lack of suitable credit, and inadequate technical assistance—the Act drew sharp fire.

The need for additional "easy" credit for farm housing has been consistently denied by the American Farm Bureau Federation, which has maintained that credit demands could be met adequately through cooperative and commercial agencies.[17] In hearings on proposed housing legislation, the Federation emphasized that adequate farm income is the only permanent guarantee of good farm housing and contended that the existing situation was attributable to the post-war scarcity and high prices of construction materials.[18] The feasibility of partial credits under Section 503 was doubted by A. S. Goss of the National Grange, who suspected they would be perverted from their purpose to reward the uncon-

[17] Amer. Farm Bur. Fed., resolutions adopted 27th Annual Convention, 1945; 28th Annual Convention, 1946.

[18] O'Neal, E. A., 80 Senate 1947, 540.

scientious and penalize the diligent.[19] In an attempt to meet this objection the period during which credits may be granted was reduced from 10 years in the original bill to five years in the final version, and the Act makes it plain that partial credits are to be used only in connection with loans made under Section 503 on "potentially adequate" farms and not in cases of delinquency.

On another occasion, Mr. Goss contended that anything other than a first lien would constitute inadequate security. There was the further danger that authority to make loans on junior liens might result in a total debt greater than the farm could support and lead to the farmer's eventual loss of home and farm as well.[20] However, security other than a first lien was retained in the Act.

The apparent absence of organized farm pressure for the housing bill aroused strong suspicion in some minds as to the need for it, despite the support provided by the National Farmers Union.[21] Some midwestern Congressmen, unconvinced of any farm housing need in their areas, suspected a "put-up" job by the Department of Agriculture in which Congress had been by-passed, and vigorously queried Departmental representatives on the point.[22]

It is not hard to answer the question, "Whence the farm housing provisions?" The President's Committee on Farm Tenancy had recommended in 1937 that the states set minimum tenant housing standards of health and sanitation.[23] The Farmers' Home Administration, in investigating thousands of applications for aid under the tenant-purchase program, had become aware of an acute need for farm housing. In 1945, a Land-Grant College committee urged that funds for remodelling or for new home construction "should be obtainable at a moderate rate of interest on a farm mortgage," with due regard for the farmer's over-all debt and his ability to make annual payments.[24] A special research committee on farm credit reported approximately the same conclusion to the Farm Credit Administration.[25] It would seem a valid function of a

[19] Goss, A. S., Master, National Grange, 80 Senate 1947, 540–545.
[20] Goss, A. S., Address to 83rd Annual Session of Nat'l. Grange, Nov. 1949.
[21] National Farmers Union, 80 Joint 1948, 5489.
[22] Cole, A. M., Cong'n., Kansas, 81 House 1949, 198–199, Buffett, H. H., Cong'n., Nebraska, 80 House 1948, 315.
[23] President's Committee on Farm Tenancy, *Farm Tenancy*, Nat'l. Resources Committee, 1937.
[24] Committee on Postwar Agr'l. Policy, *Postwar Agr'l. Policy*, Report to Assoc. of Land-Grant Colleges and Universities, 1945, p. 55.
[25] Research Committee, "The Federally Sponsored Credit Services to American Agriculture," *this Journal*, XXIX, Nov., 1947, pp. 1497–1499.

government agency like the Department of Agriculture to channelize for legislation such recommendations, over which it presumably would have jurisdiction if passed.

A charge of limited effectiveness came from those concerned with the problems of rural nonfarm families. In this group are families who are not farm operators and some of whom are not really in agriculture. Rural residents not engaged in full-time commercial farming are becoming an increasingly important population segment, and aid to this group was included in the 1947 version of the bill. Dropped in the 1948 version, this provision was restored in a nonfarm title of the 1949 Housing Act as adopted. Two religious leaders pleaded for similarly specific authorization of aid for migrant farm labor,[26] but this advice was not followed.

The advisability of authorizing the expenditure of $280 million for farm housing within a four-year period, as provided by the Housing Act, was questioned. It was suggested that this would contribute to an already swollen federal budget,[27] add weight to existing inflationary pressures,[28] and lead to excessive government activity in a private field.

The National Association of Home Builders objected to Section 509, which prohibits any landlord from changing the conditions of lease or occupancy of a tenant's house if it has been constructed or repaired with funds obtained under the Act. This intended protection for the tenant was attacked by the NAHB as "disguised rural rent-control."[29] Despite the large degree of discretion vested in local county committees, the NAHB further contended that the Secretary, being a political appointee with the power to decide who may receive a loan, might choose to use this power for political ends.

The prerequisite of an approved farm plan for loans under Section 503 was attacked by NAHB on the ground that it took management of the farm out of the individual farmer's hands and entrusted it to bureaucratic authority.[30] However, the supervised farm plan had already been widely used by the Farmers' Home

[26] Keehn, Rev. Thomas, Council for Social Action of Congreg. Christian Churches 81 Senate 1949, 885–891; O'Grady, Rt. Rev. Mgr. John, Nat'l. Conf. of Catholic Charities, 81 Senate 1949, 912.

[27] Cole, Albert M., 81 House 1949, 198–199.

[28] Amer. Farm Bur. Fed., resolution adopted, 30th Annual Convention, 1948.

[29] Nat'l. Assoc. of Home Builders, 81 Senate 1949, 552–553.

[30] Nat'l. Assoc. of Home Builders, 81 Senate 1949, 552–553; Davis, William, President, Farm Management Associates, Inc., 90 House 1948, 965–988.

Administration and its predecessor agencies. Developed as an emergency technique in the 1930's, the farm plan was incorporated in the permanent legislation of the Bankhead-Jones Tenant Purchase Act in 1937. Section 503 of the Housing Act, in one sense, merely changes the emphasis of the Bankhead-Jones Act, stressing housing as the end rather than farm ownership.

In view of the lively interest of the South in agriculture in general and "handicapped" farmers in particular, there is some reason to believe that the farm housing title, like the Bankhead-Jones Act, was to a considerable extent the product of experience with southern conditions. It received warm endorsement from several southern spokesmen. Its original authorization to aid farm "housing" was broadened to cover "dwellings and other farm buildings" at southern insistence on the need for modernization of all farm buildings to keep pace with transition in southern agriculture.[31] And the minimum required value of farm production for eligibility ($400 at 1944 prices) very possibly was chosen with the South and its small low-producing units in mind, although this provision also makes eligible many rural residents and part-time farmers in other parts of the country.

The bill elicited unfavorable reaction from several representatives of the highly commercialized and capitalized farming sections of the Midwest, one of whom referred to a study indicating that Corn Belt farms already had too much capital invested in farm buildings.[32] It was also stated that an eligibility minimum of $400 would include everything "down to a large garden."[33] Indeed, at 1944 average farm prices and yields, 1.5 acres of potatoes or 0.8 acres of tobacco would qualify a farm for housing aid.

The very small scale of operation eligible for aid, particularly for partial credits and grants, admittedly raises serious questions.[34] If certain farms are unable to support loans under Section 502, will not the grants and credits provided under Sections 503 and 504 tend to perpetuate uneconomic enterprises? The fact that a grant is needed in a period of relatively favorable farm prices, such as existed when the legislation was under consideration, would appear to be *prima facie* evidence that the farm offered as

[31] Jones, Robert, 80 Joint 1948, 1307–1308; Davis, P.O., Ala. State Director, Extension Service, 80 Joint 1948, 1318.
[32] Davis, William, 81 House 1948, 967.
[33] *Ibid.*, 973.
[34] *Ibid.*, 965–988, Goss, A. S., 80 Senate 1947, 540–545.

security for a loan is submarginal. If the operators of such farms are to be subsidized to stay on them, a wasteful allocation of productive resources may be unnecessarily prolonged.

On the other hand, the health of the family and community are often endangered by flagrantly substandard housing. At least the children, if not the entire farm family, are more likely to turn out to be useful and productive citizens as a result of the better housing afforded by the grants.

To reconcile these opposing views, the maximum allowable grant per farm of $1000 in earlier versions of the bill was reduced to $500 in the Act as passed. Moreover, it is clear that, from the beginning, such assistance was intended to finance inexpensive repairs of great urgency, such as screening, stair-guards, roof repairs, etc. No tile-and-chromium bathrooms were contemplated. While the potential economic dangers were recognized, the health and housing needs were considered urgent enough for action.

The subsidy, as a tool, may be used in various ways, but the ends involved are the significant consideration. The partial credits of Section 503 were designed to ease the transition period while the farm's productivity was being raised. The grants of Section 504 were conceived by the bill's proponents as a welfare measure or "health" grants.[35] It had been suggested previously that grants might well be made for health and education and to promote employment opportunities, but only in areas of good agricultural or industrial potential; "an agricultural subsidy for poor areas blocks progress in good areas."[36] Vance and Blackwell, concerned with tenant housing in the Cotton South, have emphasized the demonstrational value of subsidized housing for the tenant, to raise his health, efficiency, and standards of what to expect in housing; and for the landlord, to demonstrate how good housing can attract and hold good tenants and make them more efficient farmers.[37] Such demonstrations, it is argued, would aid the efforts of the extension specialists in raising farm home standards.

Debate on housing legislation indicates that better farm housing was a means to a still broader end in the minds of several southerners. A strong feeling of what Professor Joseph Davis has called

[35] Smith, R. C., 81 House 1949, 204.

[36] Mayhew, Earl, Ky. State Director, Farm Secur. Admin., in *Farm Housing—A Case Study*, Nat'l. Committee on Housing, Inc., Proceedings of Conference at Lexington, Ky., May 25–26, 1945; 1946, pp. 71–72.

[37] Vance and Blackwell, *op. cit.*, p. 158.

"agricultural fundamentalism"[38] animated their desire to rectify the present relationships between city and country. This desire sometimes posed the question, "How are we going to keep them down on the farm?" and answered it with "Better farm housing—to make farm life more attractive." It was also declared that the cities are overcrowded and that better farm housing will lure back to the countryside the urban "overpopulation." And, again, it was argued that improved farm housing will give "strength and happiness to the most stable and sound political segment of our Nation [since] farm income is the most important source of new wealth."[39]

Evaluation of the Farm Housing Program

It is estimated that 122,500 farm families will receive housing loans during the period 1950–1953, of which about 11,000 also will receive partial credits under Section 503 to aid in making the farm an economically adequate unit. In addition, about 45,200 permanently uneconomic "farms" will receive grants or loan-grant combinations.[40] These latter units represent land and labor resources both of which probably should be withdrawn from agriculture. Should all the 11,000 "potentially adequate" farms eventually become "adequate," there would still be four times that number of permanently uneconomic units encouraged to remain in agriculture. There is no way of predicting to what extent the withdrawal of these units from agriculture will be slowed as a result of housing improvements. It is even more difficult to assess the economic effect on the 111,500 "adequate" farms on which housing loans are expected to be made.

Economic soundness as an objective has been partly compromised in the farm housing provisions. So has the principle of equity. This is not across-the-board farm legislation. Over a million "census farms," including many rural residents not engaged in agriculture, part-time farmers and subsistence farmers, are excluded from financial aid because of the low value of their farm production. All farm operators are not eligible to apply for aid; only farm *owners* unable to obtain credit from conventional sources. Of the somewhat less than two million eligibles, it is estimated that

[38] Davis, Joseph S., "Agricultural Fundamentalism," from *Economics, Sociology, and the Modern World*. ed. N. E. Himes, Cambridge, Mass., Harvard Univ. Press, 1935.

[39] Jones, Robert E., 81 House 1949, 183.

[40] Lassiter, Dillard B., 81 Senate 1949, 216–217.

slightly less than 170,000 will be financially assisted in the period 1950–1953 from the fund of $280 million.[41]

We may ask: What is the function of a program in which only about eight percent of the eligibles can participate? The probable accomplishments of the farm provisions may be summarized as follows:

(1) First of all, this program will at least help some families who otherwise could not do so, to enjoy better housing and presumably better health and greater economic productivity. The eligibles probably will be carefully screened to meet high standards of ability, character, and experience. Administration of the Bankhead-Jones program demonstrated the need for such selection.

(2) The program will have a certain demonstrational value. It should raise the standards of what constitutes good housing in many areas.

(3) Admittedly an experiment, it will provide experience in administering such a program, should it eventually be expanded.

Title V of the Housing Act of 1949 will not solve the farm housing problem. As a result of it, however, rural standards of what is good housing may be expected to rise. Its loan and partial credits sections follow a pattern established in the 1930's for helping those who best can use the aid. Sound administration of the loan provisions may be able to place this phase of the operation on a nearly self-sustaining basis. The subsidy provisions considered alone may, on balance, contribute more to immediate welfare than to economic progress. However, the net economic effect of Title V will depend on the uses to which the loans and partial credits are put, and the efficiency of utilization of the resulting improvements.

The ultimate prevalence of good farm housing on a nation-wide basis, however, will depend upon adequate and stable farm income to pay for it. More adequate income for farmers in general and in the South in particular fundamentally awaits a more economic use of productive factors in the economy, and it would seem wise to do nothing that will seriously hinder developments in this direction.

[41] *Ibid.*

MEASURING THE VOLUME OF AGRICULTURAL PRODUCTION

HEINZ KRAUSE

Introduction

DURING recent years there have been extensive discussions of the world food problem and its possible solution. This is first of all a problem of food production and, second, a problem of food distribution. A logical approach to the problem of food production appears to be an inventory of the available means of production. First, how much land is available? It is very difficult to answer this question because one is immediately confronted by the disconcerting obstacle that no international definition of the term "agricultural land" has as yet been developed. The term "submarginal land," for instance, has different meanings in New Zealand, Italy, and Japan.

The meaning of the term "agricultural land" depends not only upon the type of soil, climate, etc., but also upon the economic and sociological conditions of the region or country concerned. If the agricultural production resources of the world are measured with the concept of "agricultural land" prevalent in countries with a highly intensive form of agriculture, such as Belgium or Holland, then the total figure obtained will be many times greater than that arrived at by using the present United States concept.

In each country the land usable for agriculture consists of different soil-climate types, with different degrees of fertility. However, there is no quantitative measure by which the degrees of fertility of various regions may be compared.

One of the main reasons for this astonishing situation is the fact that there is no satisfactory scale to measure total agricultural production. Wheat production per hectare of two regions can be compared without difficulty, but total agricultural production per hectare is a different matter because there is no accepted measure by which various agricultural products may be added. The use of prices for measuring the volume of agricultural production is an unsatisfactory method, particularly for international and interperiodical comparisons.

Systems of evaluating heterogeneous products have long since been developed both in the fields of animal and human nutrition, but not until recently have attempts been made to devise a system

other than prices which would provide a common measure for all types of agricultural products. For more than a hundred years various measures such as hay value, rye value, starch value, Scandinavian feed unit, corn value, etc. have been used to evaluate different types of animal feedstuffs. In the field of human nutrition the calorie value of the nutritive part of food and the amount of digestible protein have been used as common measures for the various types of food. Some time ago, in an attempt to devise a system which could be applied to all agricultural production, the old rye value was revived and transformed into grain equivalents. The evaluation of the special physiological value of protein, however, although attempted, was not solved satisfactorily, especially for international comparisons.

Recently it has been recommended that the method of counting calories and proteins separately, long used in measuring human foods, be applied to total agricultural production.[1] By using "nutritive calories" with separate evaluation of "nutritive proteins" it would be possible to evaluate not only total primary agricultural production, that is, all the vegetable matter harvested by man and his animals; but also the utilization of this production, that is, the amount used for direct human consumption, that processed into animal products used as human food, that processed into animal draft power, etc.

This system can also be used to measure the effects of the various factors of production; for example, it would be possible to express in comparable figures different degrees of soil-climate fertility as well as the influence of different economic and sociological conditions upon agricultural production. By the same method production potentials and, with this, production reserves can be estimated. Such information would be of considerable importance in connection with long-range food and agricultural policies.

This paper is intended to serve only as an introduction to the problem of measuring agricultural production. To devise a complete system with all the details necessary ready to be used internationally would be a task demanding much more work.

The Technical, Economic, and Sociological Sectors of Agriculture

In a recent discussion with a colleague on the subject of determin-

[1] For instance, W. Krueger, *Die Ernaehrung von Mensch und Tier*, Goettingen 1946.

ing agricultural production potential, he said without hesitation, "This is impossible to determine for the simple reason that agricultural production depends on so many different factors that any figure at which you would arrive would become obsolete if only one of the factors changed—and some of these factors change constantly." It cannot be denied that such changes do occur constantly; it is nevertheless important and possible to obtain some indication of the agricultural production potential of a specific area under a *given* social system, price structure, etc. If it were not possible, this would mean in effect that statistics relating to the various parts have no meaning when applied to the whole.

Perhaps this attitude more or less conditions present day thinking on agricultural problems. The explanation is probably that agriculture is still in a process of transition from the old, traditional pattern, where the individual homestead was more a means of livelihood than an economic enterprise, to a more scientific form which started with improvements in the technical sector, later embraced the economic sector, and now is beginning to include also the sociological sector, but has not yet achieved a new balance.

The technical, economic, and sociological problems of agriculture may require varying solutions, but the problems of agriculture as a whole must determine ultimate decisions. A step for the solution of a technical problem of agriculture may, for example, create new sociological or economic dilemmas. In case of famine, naturally the technical sector is most important, whereas in case of overproduction, economic and ultimately sociological considerations predominate. It is important to keep clear in one's mind in which sector the problem as such lies. It would be well to borrow the methodology of the natural sciences, which separates the factors for the purpose of analyzing the problem and attempts a synthesis only after this analysis has been completed. It is only after all the angles involved in one sector have been evaluated, that possible effects in the other two sectors should be considered. If from the very beginning the arguments belonging to different sectors are confused with each other, it is very difficult to reach a satisfactory solution.

No Satisfactory Production Measure

As was pointed out in the introduction, no satisfactory scale in

technical terms has as yet been developed for measuring agricultural production. This is particularly astounding, considering the general procedure in the natural sciences, where each phenomenon is measured as soon and as correctly as possible, and if existing scales cannot be used, a new scale is developed.

Remarkable progress has been made during the past century in the natural sciences affecting agriculture. If the great amount of technical data regarding natural productive resources could be matched with comparable facts concerning total agricultural production, it would be possible to continue much more quickly along the promising road of synthesis of correlated data. For this purpose, however, a satisfactory measure of agricultural production in technical terms is essential.

Prices are often used as a common denominator for measuring the volume of agricultural production. The monetary values of agricultural production can be expressed with current prices or with average prices. If the same price for each type of product is used, then the differences between the total values obtained for a given area for different periods indicate probable changes in the volume of agricultural production.[2]

The use of such average monetary values as indicator of volumes is a practical method which serves its purpose in cases where prices and price relationships do not differ considerably. The fiction that differences in the average monetary values correspond to differences in the volumes is a useful working hypothesis as long as it is recognized as such. The usefulness of the method, however, decreases rapidly if area and period are extended and countries or periods with different price structures are compared.

In such cases the system of using average prices should be supplemented by a system based on technical terms which do not change according to the time or area chosen. It would also be advisable to select a common denominator which could be used for measuring not only the volume of the end products of agriculture, but also the volume of total primary agricultural production and its utilization. A technical scale must be found with which it will be possible to measure and compare, for instance—using an extreme example—the volume of total primary agricultural production and its utilization of a Chinese farmer during the Ming dynasty with that of a

[2] The method is also used to indicate differences in the volume of agricultural production of two or more regions.

present-day farmer in Maryland. The prices received by both farmers are important, but quite another question not to be confused with the first one.

Monetary values are influenced by the prices and the amount of labor and capital used for production. Products which require a large amount of labor generally have a higher monetary value in regions with high labor costs than in regions with cheap labor, other conditions being similar. For instance, the price of milk compared to that of wheat is generally twice as high in the United States as in Europe, and potatoes even four times higher. Therefore the same potato crop would be valued four times as high compared to the wheat crop if United States, rather than European, average prices were used.

The United States is an economic entity, with the same currency, not divided by tariff walls, etc. Nevertheless, there are still considerable differences in average price levels and price relationships, even if only the average prices of the nine geographic divisions are compared. Whereas according to the U.S. national average, during the period 1935–39, one pound of eggs equals in price 9.8 pounds of wheat, in the Mountain region it equals 12.9 pounds of wheat; and the price of one pound of hog (live weight), national average, was equal to that of six pounds of wheat, while in the South Atlantic region it equalled only five.

Considerable differences would also exist between U.S. production measured on the basis of U.S. average prices and that based on "world" ones; or between production measured on the basis of average prices of one period and that based on average prices of another. The fact is, prices are constantly changing in absolute terms, and the relationships of prices of different products to each other. The use of "average" prices represents an effort to remedy this defect, but it does not correct the fundamental weakness of a scale based on prices as a measure not of the monetary *value* but of the *volume* of agricultural production.

Primary and Secondary Agricultural Production

The mysterious capability of the green plant cell to use and preserve energy which enters our planet from outside in the form of sunlight is the basis of all living things on earth. The farmer tries to promote this mysterious process and to direct it into channels most advantageous to him. This form of agricultural activity is in the real sense of the word the only "primary production" which

the farmer performs. It is the basis of all agricultural food production, and should be called "total primary agricultural production." It includes food crops, industrial crops, feed crops, grass grown on pasture and consumed directly by livestock; in other words, all plant products harvested by man or his animals.

Usually the greater part of the total vegetable matter produced is transformed into animal products such as meat, milk, draft power, etc. This transformation of vegetable matter into animal products is not only a different but actually the reverse process compared with the production of vegetable matter. In the latter case energy is concentrated, but by obtaining animal products a great part of the concentrated energy given in the form of feed is dispersed. This transformation of vegetable matter into animal products is here called "secondary agricultural production," and should be clearly distinguished from "primary agricultural production."

Once the distinction between primary and secondary agricultural production is clear, it seems logical to evaluate at first total primary agricultural production, without regard to its utilization. Only after this evaluation of total primary production has been accomplished should it be divided according to its utilization: for direct human consumption, such as flour, potatoes, vegetables, etc.; for indirect human consumption, in the form of meat, milk, etc.; for production of animal draft power, etc.

A different way of approaching the problem of measuring agricultural production is to count only the products which leave the farm or which are consumed on the farm by human beings. They are partly primary products and partly the result of processing primary products. An approach like this does not go into the farm but watches only what comes out of it, including human consumption on the farm.

In both cases the picture becomes more complicated by taking into account, for instance, the import of feeding stuffs, changes of stocks from year to year, and replacement of animal by mechanical draft power. The first approach, beginning with total primary agricultural production and ending with its utilization, is more logical because primary production is clearly distinguished from processing.

Evaluation of Primary Agricultural Production

The only technical measure of agricultural production which appears relatively satisfactory is the calorie value of the nutritive

part of each product. This will be used in the following, supplemented by a protein-calorie ratio (PCR), which expresses the quantity of digestible protein in grams per 100 net calories.[3,4]

The nutritive part of a product and therefore its corresponding net calorie value differs in many cases, however, according to whether the product is consumed, for instance, by man, cattle or poultry. The only absolute measure in this respect is the gross value, since it is a purely physical measure, but gross values give no indication of the nutritive part. This is illustrated in Table I.

TABLE I. COMPARISON OF GROSS AND NET CALORIE AND PROTEIN VALUES OF WHEAT, CORN, POTATOES AND FODDER BEETS
(per kilogram)

	Wheat		Corn		Potatoes		Fodder Beets	
	Calories	Protein	Calories	Protein	Calories	Protein	Calories	Protein
	Number	Gram	Number	Gram	Number	Gram	Number	Gram
Gross value	3,740	123	3,840	94	890	17	380	9
Net value								
human consumption	3,000	100	3,300	87	750[a]	11[a]	—	—
fed to ruminants	2,960	103	3,300	69	660 700[a]	7 9[a]	230	6
fed to hogs	2,850	102	3,300	78	760 810[a]	5 12[a]	210	3
fed to poultry	2,600	97	3,010	76	540[b]	13[b]	210	5

[a] Cooked.
[b] Raw or cooked.
Based on figures in W. Krueger, *Die Ernaehrung von Mensch und Tier*, Goettingen 1946.

On the other hand, it would be impractical to have different values for one product, depending on how it is used. It may be recommended that *one* net value for calories and proteins be accepted for each product. The principle applied in the selection of

[3] Fat has a nutritive calorimetric value 2.4 times as high as carbohydrates or net proteins; therefore a higher proportion of fat would result in a larger amount of calories. If this were considered as an insufficient indicator, fat could also be additionally expressed in a fat-calorie ratio.

[4] Grain equivalents as a scale for measuring agricultural production (see Woermann, "Ernaehrungswirtschaftliche Leistungsmasstaebe," *Mitteilungen fuer die Landwirtschaft*, Berlin, 2 Sept. 1944) seem to have the great advantage that they are something which can be visualized. But they are not as homogeneous a measure as they appear to be. This is due to the attempt to combine in one figure both the net calorie value and the special physiological value of protein. This is generally done by counting the net calories of protein two and a half times, which increases the relative value of products rich in protein and decreases the relative value of products with a low protein content. One kilogram of soybean meal (with 380 grams of net protein), e.g., is then equal to six kilograms of potatoes (with only 66 grams of net protein). Grain equivalents therefore do not show the actual protein content, the significance of which is quite different, depending on whether protein is scarce or abundant. In the latter case the protein surplus has only the physiological value of carbohydrates. For this reason grain equivalents are only of limited value for international comparisons.

the net value should be to take that which the product has when used most advantageously, that is, in such a way as to produce the largest possible supply of calories and protein for human consumption. For all primary products which can normally be consumed directly by man the net calorie and protein value for such consumption should be selected, regardless of whether the particular quantity actually reaches this end. For the rest of the primary products the highest net (feed) value should be selected. If some animals use this or that feed less advantageously, this should not change the evaluation of the feed. The fact that poultry, for example, uses all four products listed in Table I less advantageously than cattle, hogs, and human beings, is important for feeding practices and emergency food policies; and this will be expressed by a less favorable processing ratio (see page 617).

As an illustration of the measurement of the total primary agricultural production of one country some estimates for prewar Germany may be used. During 1936–37 Germany's total primary agricultural production was estimated at 215,000 billion net calories, including 6.3 million tons of net protein.[5] This represents about three million net calories, including 89 kilograms of net protein, per acre of total agricultural land; and 3.2 million net calories, including 93 kilograms of net protein, per capita per year; or 8,850 net calories, including 260 grams of protein, per capita per day.

The average daily consumption per capita in Germany before the war amounted to about 3,000 calories, of which a little over four fifths or about 2,500 calories was domestically grown. The protein consumption amounted to about 90 grams per capita per day, of which nearly nine tenths or about 80 grams was domestically grown. Compared with the total primary agricultural production per capita given above (8,850 calories including 260 grams of protein), these consumption figures represent 28 percent of the number of net calories and 31 percent of the net protein actually produced.

In other words, more than two thirds of total primary agricultural production was lost during the process of transformation into secondary (livestock) products or was used for the production of animal draft power, which is also a form of processing. These

[5] Of this more than 40 percent of the calories and nearly 50 percent of the protein was obtained from forage crops.

"losses" are still higher in some countries, for instance, in New Zealand, or considerably lower in other countries, for instance, in Japan. The ratio of human food to total primary agricultural production is an important figure in any evaluation of a country's agriculture.

With increasing vegetability of human nutrition the area necessary to feed a person will be smaller, as will the difference between total primary agricultural production and the total amount of human food. The replacement of animal draft power by mechanical power tends in the same direction.

The industrial production of fertilizer is a further possibility of increasing production per acre and therefore decreasing the amount of land necessary to feed one human being. Modern intensification of agriculture depends to a great extent upon the existence of an efficient industry. Highest agricultural productivity per acre is therefore found mostly in countries where the creation of an urban-rural symbiosis is induced by the concurrence of land shortage and modern industry.

Primary non-food and non-feed agricultural products, often called industrial crops, such as fiber, tobacco, hops, etc. are in the case of German agriculture relatively small. Only one third of one percent of total agricultural land is occupied by these crops. In other countries the percentage of the area devoted to the cultivation of non-food and non-feed crops is often larger, particularly where much cotton, coffee, etc., are grown. But even then, it is seldom that more than five percent of the total agricultural land is used for this purpose if countries as a whole and not particular regions thereof are considered. Nevertheless, some system must be devised for measuring the volume of production of such crops.

Most of the non-food and non-feed crops have a low calorimetric value due to the fact that they are not grown for the purpose of accumulating energy in the form of vegetable matter. If agriculture's main purpose is considered to be food production, then these non-food and non-feed plants are alien. To evaluate them it seems advisable to use as measure the calorie value of a substitute crop which in theory could have been grown instead; for example, peanuts instead of cotton. It may also be advisable to use a similar special evaluation for certain types of vegetables and fruit with low calorie value per acre which are grown mainly to satisfy consumer tastes and which often have a high vitamin content. These also

occupy only a very small percentage of the total agricultural area.

The above suggested special evaluations are in one respect unfortunate, because they destroy the unity of the system of measuring agricultural production, but they seem to be the best possible solutions. However, if such special evaluations are used, they should be agreed upon internationally in order to avoid a multiplicity of systems.

Evaluation of Secondary Agricultural Production

Part, in most cases actually the greater part, of total primary agricultural production is, as stated above, fed to livestock. This "primary agricultural feed production" is given to livestock to obtain animal products for human food, animal draft power, and animal products of non-food character, such as wool, hides, etc. For the evaluation of these secondary agricultural products it is necessary to find a technical measure with which they can be compared among themselves, with primary agricultural production as a whole, and with those parts of it which are used directly as human food or as raw materials for industry, such as fiber or tobacco.

From the standpoint of human nutrition, only the nutritive value of food is of importance. But from the agricultural point of view, the evaluation of secondary food products according to their calorie and protein value would be very misleading with respect to the intensity of land utilization. It would result in an underevaluation of those farms or regions which use a great part of their total primary production to provide animal products. Furthermore, there would be no such measure for other animal products such as animal draft power, wool, hides, etc. It therefore seems more logical to measure livestock products in terms of the calorie and protein values of the feed used.

Special problems in measuring secondary agricultural production which are difficult but by no means insoluble arise with the distribution of the feed to two or more simultaneously yielded products, such as milk and calf or wool and hides and meat. The allocation of feed consumed to each ultimate product will vary, depending on conditions. For example, the proportion of feed consumed by a cow which should be allocated for the production of the calf would be smaller if milk production amounts to 5,000 quarts than if it is only 2,000 quarts. Some kind of general agreement concerning

a system of allocation of feed to the various end products should be reached for comparability of the results obtained.

Finally, the production of animal draft power must be expressed in terms of calories and proteins. In the case of horses, mules, etc. this is relatively simple if no breeding is done, because the production of draft power is overwhelming compared with the value of the old horse, etc. It becomes more complicated in the case of oxen and still more when cows are used as draft animals.

Utilization of Total Primary Agricultural Production

If food policy is not to be limited to procurement of additional supplies from abroad or the export of food surpluses, but considers also the possibilities of influencing production, a food balance which counts only the products for human consumption is not sufficient. One is required which counts not only the number of calories at the end of the production line, but also includes the whole process of production. It should start with total primary agricultural production and its utilization, and use the same measure from beginning to end. In order to influence production it is not enough to sit outside the factory and compare the amount that comes out with that which emerged some years before; it is necessary to go inside and find out all about the process of production, not only of individual products, but of production as a whole. In agriculture, more than in any other field, the different branches of production are very dependent upon one another. An investigation of this sort is certainly easier to make with the help of a reliable yardstick. The measure outlined above is believed to be a more reliable yardstick for this purpose than any other which has been proposed.

Total primary agricultural production consists of: (A) primary food production; (B) primary feed production; (C) primary non-food and non-feed production; and (D) seed and waste. Primary food production includes all vegetable matter consumed directly by man, such as wheat minus bran, sugar beets minus the parts which are used as feed, etc. Primary feed production includes, besides such products as fodder beets, grain and hay, the offals of food production and pasture. Primary non-food and non-feed production is comprised of such products as fiber plants, tobacco, etc. The last-named category are the seed used on the farm and the amount wasted prior to the time the products leave the farm.

Primary feed production is used for three main purposes: 1) the transformation of vegetable matter into animal products used as human food, i.e., secondary food production; 2) the transformation of vegetable matter into animal draft power, i.e., animal draft power production; 3) the transformation of vegetable matter into

TABLE II. UTILIZATION OF TOTAL PRIMARY AGRICULTURAL PRODUCTION
First Example (Simplified)

Items	Evaluation According to			
	Net calories		Net protein	
	Numbers in 1.000	Percent of total	Kilo-grams	Percent of total
	1	2	3	4
A. Primary food production	660	22	18.0	20
B. Primary feed production	2,160	72	65.7	73
C. Primary non-food and non-feed production (fibres, tobacco, etc.)	90	3	1.8	2
D. Seed and waste	90	3	4.5	5
Total primary agricultural production	3,000	100	90.0	100
E. Feed for secondary food production	1,740	58	54.0	60
F. Feed for animal draft power product.	360	12	9.9	11
G. Feed for non-food and non-draft power production (wool, hides, etc.)	60	2	1.8	2
Primary feed production (B)	2,160	72	65.7	73
H. Secondary food production (consumption value)	240	8	17.1	19
J. Losses by secondary food production	1,500	50	36.9	41
Feed for secondary food production (E)	1,740	58	54.0	60
K. Total food production (A plus H)	900	30	35.1	39

products which are used for other purposes than human nutrition or draft power, products such as wool and hides, i.e., secondary non-food and non-draft power production.

In the northern parts of middle and western Euorpe an average total primary agricultural production of three million net calories per acre of agricultural land and 90 kilograms of net protein would be considered normal. This yield has been selected for the example given in Table II. The first section of this table, items A to D, shows the composition of total primary agricultural production. The second section, items E to G, shows the utilization of one part

of primary agricultural production, namely, primary feed production. The third section, items H and I, shows the utilization of feed for secondary food production. The final result of the foregoing computations is given in item K, total food production. All the figures are given in net calories (columns 1 and 2) and in net protein (columns 3 and 4).

TABLE III. UTILIZATION OF TOTAL PRIMARY AGRICULTURAL PRODUCTION
(Including import and export of feed)
Second Example

Items	Evaluation according to			
	Net calories		Net proteins	
	Numbers in 1,000	Percent of total	Kilograms	Percent of total
	1	2	3	4
A. Primary food production	150	10	4.1	9
B. Primary feed production	1,215	81	36.9	82
C. Primary non-food and non-feed production (fibres, tobacco, etc.)	90	6	2.2	5
D. Seed and waste	45	3	1.8	4
Total primary agricultural production	1,500	100	45.0	100
E. Feed for secondary food production	885	59	27.4	61
F. Feed for animal draft power product	150	10	4.1	9
G. Feed for non-food and non-draft power production (wool, hides, etc.)	90	6	2.7	6
L. Feed exported	90	6	2.7[a]	6
Primary feed production (B)	1,215	81	36.9	82
Lh. Food equivalent of feed exported	12	−.8	−.8	1.8
H. Homegrown secondary food production (consumption value)	120	8	8.1	18
J. Losses by homegrown secondary food production	765	51	19.3	43
Feed for secondary food production (E)	885	59	27.4	61
M. Feed imported	45	3	2.2[b]	5
Mh. Food equivalent of feed imported	6	−.4	−.7	1.5
K. Total homegrown food production (A plus H)	270	18.0	12.1	27.0
K plus Lh. Total homegrown food production equivalent	282	18.8	13.0	28.8
K plus Mh. Total food delivery	276	18.4	12.8	28.5

[a] Assuming 3.0 PCR.
[b] Assuming 5.0 PCR.

Table III gives the same computations for another example for which a lower production per acre and a different utilization is assumed. In this example an additional element, the import and export of feed, is also taken into consideration. If homegrown primary feed production is supplemented by imports, secondary food production must be divided into that based on homegrown feed (K), and that based on imported feed (Mh). If feed is exported the food value of this feed should also be estimated (Lh). Three types of total food production are therefore distinguished: (1) total homegrown food production (K); (2) total homegrown food equivalent (K plus Lh); and (3) total food deliveries (K plus Mh).

Total primary agricultural production and its utilization should furthermore not only be evaluated in relation to the amount of land used for its production, but also labor used. This could be done in the same way as illustrated in relation to the amount of land in Tables II and III. Where land is relatively abundant or cheap, labor relatively scarce or expensive, intensity of production per acre is usually low. Where land and labor are expensive, only high prices assure high production intensity per acre.

Utilization and Processing Ratios

Food production of a given area depends first on the amount of total primary agricultural production and second on its utilization. This utilization can be expressed in percent of total primary agricultural production. One set of such ratios is listed in columns 2 and 4 of Tables II and III.

The basis of secondary agricultural production is the primary feed production which in most cases represents more than half of total primary agricultural production. Table IV shows some feed utilization ratios based upon production figures given in Tables II and III.

The third important group is that of the processing ratios; those between consumption value and production value. They can only be applied to the production of secondary human food, because this is the only case in which consumption or food value in contrast to production or feed value exists. They can be used to measure the amount of feed for a single product, for instance, for the production of 100 kilograms of pork, or they can be used for total secondary food production of an area. As an illustration of the latter type of

TABLE IV. FEED UTILIZATION RATIOS

Item	Table II		Table III	
	Net calories	Net proteins	Net calories	Net proteins
	Feed utilization ratios (in percent of total primary feed production)			
Homegrown feed for secondary food production	80	79	73	74
Homegrown feed for animal draft power production	17	18	12	11
Homegrown feed for non-food and non-draft power production	3	3	7.5	7.5
Feed exported	—	—	7.5	7.5
Feed imported	—	—	3.7	6.0

processing ratios, Table V was set up, based also on figures given in Tables II and III.

These three groups of ratios are important for building up a system of classifying agriculture according to land utilization in the technical sense.

TABLE V. PROCESSING RATIOS

Item	Table II		Table III	
	Net calories 1,000	Net protein Kilograms	Net calories 1,000	Net protein Kilograms
H. Secondary homegrown food production (Consumption value)	240	17.0	120	8.1
E. Homegrown feed used for food production (Production value)	1740	54.0	885	27.4
	Processing Ratios*			
	14	33	14	30

* Item H in percent of item E, that is consumption or food value in percent of production or feed value.

$$\frac{\text{Food value} \cdot 100}{\text{Feed value}} = \text{Processing ratio, e.g. } \frac{240 \cdot 100}{1{,}740} = 14$$

$$\frac{\text{Feed value} \cdot \text{Processing ratio}}{100} = \text{Food value, e.g. } \frac{1{,}740 \cdot 14}{100} = 240$$

$$\frac{\text{Food value} \cdot 100}{\text{Processing ratio}} = \text{Feed value, e.g. } \frac{240 \cdot 100}{14} = 1{,}740$$

Human Food Per Acre

How many days can a man live comfortably in "Western style" from the total food for human consumption produced on one acre of the land selected as examples in Tables II and III? In the first case the assumption was made that from one acre of agricultural land (including pasture) a total primary agricultural production of three million net calories, including 90 kilograms of net protein, was obtained. From this primary production 30 percent or 900,000 net calories was used as human food, including 35 kilograms of net protein or 39 percent of the net protein contained in all primary products. At the rate of 3,000 net calories, including 90 grams of net protein per capita per day, the 900,000 calories and 35 kilograms of protein would supply enough food energy to feed one man for 10 months and enough protein for 13 months.

It is probably not necessary to mention that figures such as these are not the final answer. The composition of food, types of proteins, vitamin content, etc. are important; nevertheless, these two figures, 10 and 13 months' supply respectively, from one acre, are important as a first indication of the basic productivity of an agricultural area in respect to human food.

In the second example (Table III), 276,000 net calories and 12.8 kilograms of net protein would be available for human consumption. This would supply one man only for three months with food energy and for less than five months with protein, which is only about one third that of the first example, although total primary agricultural production is one half that of the first example. This is due to the different utilization of total primary agricultural production.

Practical Application

The most important advantage of the system outlined is the far greater possibility of utilizing the available statistical material. The use of a universal and fixed common denominator increases to a remarkable extent the range of quantitative comparison of the different types of statistical data in existence. The same system of evaluating and comparing can be applied, no matter to what types of farms or to what country or period the statistics refer, or whether they refer to one individual farm or to national agriculture as a whole.

Food statistics can be divided into four main groups: food pro-

duction, foreign trade in agricultural products, stocks of food, feed and livestock, and food consumption. Food statistics therefore penetrate the problem from both the production and the consumption side.

With the improved quantitative comparability of the different types of statistics, *total* food production and consumption can be checked with one another, not only the production and consumption of individual products or groups of products, as has hitherto been the case. The importance of a common denominator has been illustrated in research which has been carried out for several years, measuring the yearly feed consumption of the different classes and the total livestock population of the United States. By the application of a carefully developed scale to existing statistics remarkable results have been obtained in this field.[6]

Before this system of measuring agricultural production can be applied, three tables should be set up for working tools. The first table must contain the average net calorie and net protein content of the primary agricultural products (see p. 610). The second must show the substitute crops for non-food and non-feed primary production, including corresponding yield figures and the special evaluation for certain types of fruits and vegetables (see p. 615). The third table must show the various standard processing ratios and deviation factors.[7] Most of the data required for setting up these tables can be found in the literature.

After the system of measuring total primary agricultural production and its utilization has been applied to varying types of farms and different areas and periods, the next great step to be taken is to connect the results obtained (agricultural production per acre) with the different degrees of natural fertility of the land used for this production (soil-climate factors). In other words, the system should be extended so far that it can be used to measure

[6] R. D. Jennings, *Feed Consumed by Livestock*, Washington 1946.

[7] The knowledge of how to use the available feed most advantageously is very unevenly spread. Only where feed scarcity forces the farmer and knowledge enables him to use the available feed in the best possible way, are processing ratios relatively favorable. Standard processing (calorie and protein) ratios should be set up showing the utilization of food nutrients which may be expected, not in an experiment station but in the feeding practice of a modern farm (a similar concept to that used in determining production potentials—see page 621). The differences between these standard processing ratios and the actual processing ratios of the farm or area in question should be expressed as degrees of deviation from the standard and would indicate production reserves which could be mobilized by extension services.

agricultural production intensity, production potential and production reserves. This plan is outlined in the following section.

Intensity, Potentials, and Reserves

The system of measuring agricultural production and its utilization which has been outlined can be applied not only to existing production, but also to potential production by taking into account the differences in natural soil-climate fertility. Agricultural land, including pasture, should be classified into 10 or 12 soil-climate fertility types (international land fertility classification). In order to correlate natural fertility with production it is advisable to express natural fertility in terms of production potential.

As has been pointed out, in some countries land used for agriculture includes parts which in other countries would be considered sub-marginal, or in one country land with low natural fertility is used only by very extensive methods, whereas in another, similar land may be used as the basis for a much more intensive type of agricultural production. Variations in the amount of total production per acre are therefore not necessarily only expressions of differences in soil-climate fertility, but they also reflect existing economic and sociological conditions. The degree of exploitation of existing natural fertility depends on economic and sociological factors.

In order to measure natural fertility in terms of production potential, the *theoretical elimination of economic and sociological differences* is necessary. A fixed economic and sociological concept must be used as a working hypothesis. It would be advisable to select as the basis an economic and sociological structure which actually exists in highly developed countries with a general superior standard of living, but with a sociological and economic structure which necessitates an intensive use of the available agricultural resources. On this assumption, the production potentials of the different soil-climate types must be determined.[8]

The selected economic and sociological structure which would be used as a basis should be applied to all regions and countries investigated, regardless of whether their actual economic and socio-

[8] There does not yet exist an accepted system of estimating production potentials. Probably the best solution would be to take the results obtained over a period of years by the most efficient farmers (who farm say five percent of the total agricultural land), making sure that a fair representation of the different types of farms is included.

logical structure differs little or widely from the basic one. Such fictions are useful implements as long as one does not confuse them with realities. The "homo oeconomicus" does not in fact exist, but this concept is a very useful fiction for clarifying complicated realities, as long as it is recognized as representing only part of the influences which must be considered. In the German soil survey (Reichsbodenschaetzung) the economic conditions of the province of Saxony were taken as a theoretical basis for all parts of Germany, and this fiction proved to be very useful.

Each soil-climate group can be classified according to its total primary agricultural production potential per acre of agricultural land used. This potential is called *basic production potential.* From the basic production potentials of the various soil-climate groups the average basic potential of a district may be determined. Assuming that in a given area several soil-climate types have been found and basic production potentials have been determined for the various groups, ranging say between one and five million net calories, with two to four PCR, per acre, with an average of three million net calories with three PCR, this average is in fact the quantitative expression of the existing natural fertility of the district.

The *present production* may, however, be much lower, say only one third of this basic production potential. The present production could, theoretically, be raised three times to three million net calories per acre to reach the basic production potential if—and only if—the economic and sociological structure selected as international basic could be applied to this particular area.

In the example given, however, the actual economic and sociological structure differs from the basic structure, and its *present production potential* is, with two million net calories, with three PCR, considerably lower than its basic production potential. In other words, the production potential as measured by the production of the most efficient farmers under the *existing* economic and sociological structure is one third lower than it would be under the *basic* economic and sociological structure.

If the present agricultural production amounts to one million net calories per acre, the present production potential of agricultural land in use amounts to two million and the corresponding basic production potential to three million net calories, then the *present production reserve* amounts to one million and the *basic*

production reserve to two million net calories per acre. These figures are summarized as follows:

	In million net calories of total primary agricultural production
Basic production	3
Present production potential	2
Present production	1
Basic production reserve	2
Present production reserve	1

Besides the land at present actually used for agricultural purposes there are in many parts of the world additional areas which could be used for agricultural production. The concepts of present production potential and basic production potential could also be applied to these areas. The full amount of these production potentials must be considered as additional production reserves.

The increase of production on the land at present in use toward the present production potential can be fostered by intensive and well adapted extension services, but beyond this potential a change in the economic and sociological structure would have to be made. In practice, however, intensification of agricultural production and gradual change of economic and sociological patterns often go hand in hand. Furthermore, it would only be possible "in theory" to reach the production potential within the corresponding economic and sociological structure, because "in practice" a considerable part of the farmers will always lag behind the average of the group of most efficient farmers whose production is used to estimate production potential. But it must be emphasized that in research such as that proposed here, the separation of theory and practice is a *sine qua non*. It is necessary to rediscover the decisive importance of preliminary theoretical approaches. If this is not done, there is danger of losing one's way and finally ending up either in a helpless admiration of the diversified landscape or in a retreat to some conveniently limited special subject, as so many others have done.

SHORT RUN DEMAND AND SUPPLY IN THE HOG MARKET*

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I

THE purpose of this paper is to suggest a simple method that may sometimes be useful for obtaining information about economic variables from unusual circumstances which occur in the economy and to present some results obtained by applying this method in a study of the economic effects of the 1948 Packinghouse Workers' strike. After a brief description of the method, elasticities of supply and demand as revealed by the strike will be presented. The empirical work which led to these estimates will then be reviewed, followed by an evaluation of the results obtained and some suggested uses.

If price and quantity in a market are considered to represent the point of intersection of the market supply and demand curves during the time period for which they are computed, estimation of elasticities of the curves becomes a problem in inferring their their shapes from the price-quantity observations which they generate as they shift through time. A familiar way to go about this is to set up a complete econometric model and then to apply modern statistical techniques in solving for the parameters which describe the curves. If, however, there is a disturbance—such as a strike—which causes a shift in only one of the curves, it may be possible to estimate the slope of the other one directly. For when the values that the price and quantity would have taken in the absence of the disturbance are known, two points are given—price and quantity in the absence of the disturbance, and observed price and quantity during the period of the disturbance—which lie on the curve which was not affected. From these two points the slope of this curve may be computed.

The 1948 strike of Packinghouse Workers lasted from March 16 to June 9, although a number of plants had resumed operations by the latter part of May. The strike was nationwide, and about 150 packing plants were shut down at the outset of the strike. Although

* This study was conducted in part under a contract between the University of Chicago and the Bureau of Agricultural Economics financed from funds authorized under the Research and Marketing Act of 1946.

the retail price of meat did not appear to rise as a consequence of the strike, the price of livestock dropped markedly. Unstruck packers expanded output, and farmers held over some of their hogs until June, when the strike was over and livestock prices rose to approximately their previous level. Farmers were responding to a fall in price during the strike by curtailing marketings, and unstruck packers were responding to an increased margin by expanding slaughter.

These were the facts that suggested that it should be possible to estimate short run elasticities of supply and demand in the hog market. The strike was a disturbance which caused a shift in the packers' demand for hogs. By isolating the price and quantity change attributable to the strike, the elasticity of supply of hogs by farmers can be measured, for the price and quantity change must have been along this supply curve. In Figure 1, point B represents price and quantity which actually prevailed during the strike. Point A represents price and quantity which would have prevailed if there had been no strike. Knowledge of these two points enables measurement of the supply elasticity.

Quantities and prices corresponding to point B are a matter of record. Those corresponding to point A were estimated, by methods which will be described in the next section. Two alternative estimates of quantity led to two different estimates of elasticity, and the true figure was assumed to lie between them.

Arc elasticities of supply for April as computed from the two alternative estimates are:[1]

(April) Method I: .73
(April) Method II: 1.77

This indicates, in other words, that a one percent change in price to farmers was associated with a change in quantity which they marketed of between .73 and 1.77 percent.

If a linear approximation to the supply curve is desired, the following solutions are obtained:

(April) Method I: $Q=26.2\ P+C_{\text{I}}$
(April) Method II: $Q=68.1\ P+C_{\text{II}}$[2]

[1] No attempt was made to reconcile the discrepancy in results obtained from the two methods, although the range might be considered wide for most purposes. This is a reflection of inherent difficulty in estimating quantities on which the elasticities are based. Rather than attempt a more precise figure, the range between the two alternatives is left as a rough indication of the reliability of estimation.

[2] $C_{\text{I}}=537.3$; $C_{\text{II}}=-825.9$.

where Q= millions of pounds of live hogs and P = price received by farmers in dollars per hundred pounds. This means that in April a change in price of one dollar per hundred pounds to the farmer was associated with a change of between 26.2 and 68.1 millions of pounds of hogs marketed.

To indicate the relationship between the elasticity for different time periods, an estimate was also made for the period of April and May taken together. The elasticity of supply for a period as short as a day or a week is probably very large. This is because the farmer can vary the date of marketing within short periods with little expense, but as the time period lengthens this becomes more costly. It is thus to be expected that the elasticity for the two-month period is smaller than for one month. For April-May, the elasticities are:

(April-May) Method I: .51
(April-May) Method II: .90

In addition to these supply estimates, packer demand for hogs was studied. In Figure 1, two points on the demand curve of a group of unstruck packers are points C and D, the latter actually observed and the former estimated in the absence of the strike. By considering such groups of packers and observing by how much their output expanded, it was possible to estimate their demand elasticity for hogs.

The elasticity taken here was the relative change in quantity associated with a given relative change in the price of livestock, when the retail price of meat products, and also all other relevant variables in the demand function, remain unchanged. The fact that retail prices did not appear to be affected by the strike made such an estimate possible. This formulation envisages packers simply as demanding livestock and supplying meat products. Packer demand will then shift with changing prices of meat products.

Four groups of meat packing establishments were studied; (1) non-federally inspected, (2) federally inspected at other than "32 centers," (3) federally inspected at Indianapolis-Cleveland-Cincinnati, and (4) federally inspected at St. Louis. These groups represent three main categories of meat processors. The first is composed of small firms whose products do not enter interstate trade. Because the "32 centers" cover every principal slaughtering

area in the Corn Belt, the second group represents packers whose products enter interstate trade but who are not located near the main source of supply. The third and fourth groups represent packers in or near the Corn Belt and are thus more likely to be typical

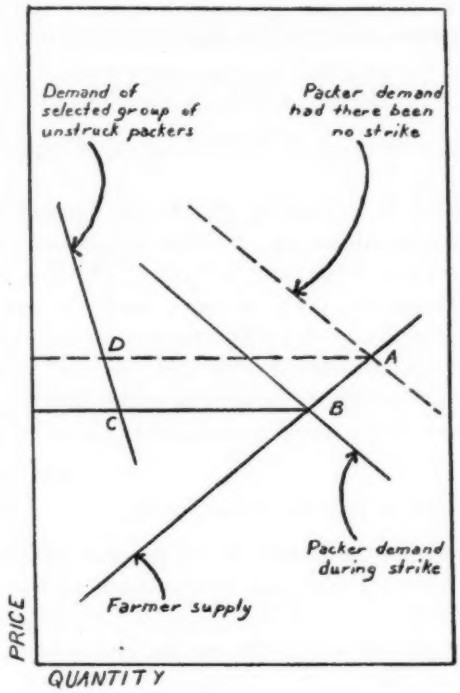


FIG. 1

of those who account for the largest demand for hogs. There were a few struck plants in each of these groups, but the number was relatively small. The following elasticities of demand were obtained for the month of April:

	Method I	*Method II*
(1) Non-federally inspected	1.80	.81
(2) Federally inspected at other than "32 centers"	3.50	2.45
(3) Federally inspected at Indianapolis-Cleveland-Cincinnati	3.93	2.90
(4) Federally inspected at St. Louis	3.61	2.56

By weighting these various groups according to the relative importance of the packers they represent, a demand elasticity for the industry was obtained:

	Method I	*Method II*
Aggregate elasticity of demand	3.29	2.26

Linear approximations to the demand curve for April are:

$$\text{(Method I)}: Q = -138.6\,P + C_{\text{I}}$$
$$\text{(Method II)}: Q = -\ 97.3\,P + C_{\text{II}}^{3}$$

where Q = millions of pounds of live hogs and P = price per hundred pounds.

An alternative to envisaging packers as demanding hog inputs and supplying meat outputs is to think of them as facing a demand for meat marketing services. The "price" of these services is the "margin" between the price of meat products and that of livestock. Packers' actions can be represented by a supply schedule of these services, i.e., the schedule of quantities of hogs which they will process at varying margins. Using the Department of Agriculture measure of the margin, elasticities obtained are:

	Method I	*Method II*
Elasticity of Supply of Hog Marketing Services	1.95	1.36

That is, a change in the *margin* of one percent was associated with a change of between 1.36 and 1.95 percent in quantity of hogs taken by packers.

Linear approximations to the supply curve of hog marketing services for April are:

$$\text{(Method I)}: Q = 138.6\,P + C_{\text{I}}$$
$$\text{(Method II)}: Q = \ 97.3\,P + C_{\text{II}}^{4}$$

where Q = millions of pounds of live hogs and P = margin in dollars per hundred pounds.[5]

II

In this section, derivation of the estimates upon which the foregoing elasticities and slopes are based is described. This is done in

[3] $C_{\text{I}} = 3932.2$; $C_{\text{II}} = 3137.0$.

[4] $C_{\text{I}} = -1182.2$; $C_{\text{II}} = -509.0$.

[5] The slope of the supply curve of meat marketing services is exactly equal and of opposite sign to the slope of the packer demand curve. This is because a given change in the price of hogs is equivalent to an equal change of opposite sign in the margin.

detail because the reliability of the results depends on decisions made at each of the steps which led to their final calculation.

Estimated Price. The method used to estimate what the price of hogs would have been was suggested by data shown in Table I. Inventory changes, which usually follow a noticeable seasonal pattern, were considerably greater during the strike months than would have been expected from the seasonal trend as computed by the

TABLE I. PRODUCTION, STORAGE HOLDINGS AND PRICE OF PORK, OCTOBER 1947-JULY 1948

	Cold storage holdings of pork in public warehouses and packing plants[a] (million lbs.)	Percentage change in cold storage holdings during month[b] (percent)	Average 1938–47 percentage change in cold storage holdings during month[c] (percent)	Total U.S. pork production[d] (million lbs.)	Retail quantity of pork[e] (million lbs.)	Composite retail price of pork cuts per pound including lard[f] (cents)
Oct., 1947	196	− 4.1	− 9.0	701	709	51.8
Nov.	188	+ 9.0	+27.0	932	715	48.4
Dec.	305	+73.8	+42.0	1,065	840	49.0
Jan., 1948	530	+23.6	+25.4	931	806	50.3
Feb.	655	+ 7.0	+ 5.4	681	635	43.8
Mar.	701	− 5.4	− 3.4	677	715	44.4
Apr.	663	− 7.5	− 4.5	632	682	45.0
May	613	− 4.6	− 2.2	656	684	46.2
June	585	−13.2	− 3.6	776	853	47.1
July	508	−30.1	− 8.1	579	732	49.1

[a] Holdings as of the first of the month of pork frozen, dry salt, pickled, cured and in process of cure. Source: *The National Provisioner.*

[b] Change in holdings to first of next month as a percentage of this months holdings.

[c] Source: *Livestock Markets News, Statistics and Related Data, 1947*, USDA, p. 56.

[d] Source: *Livestock Slaughter by States*, USDA.

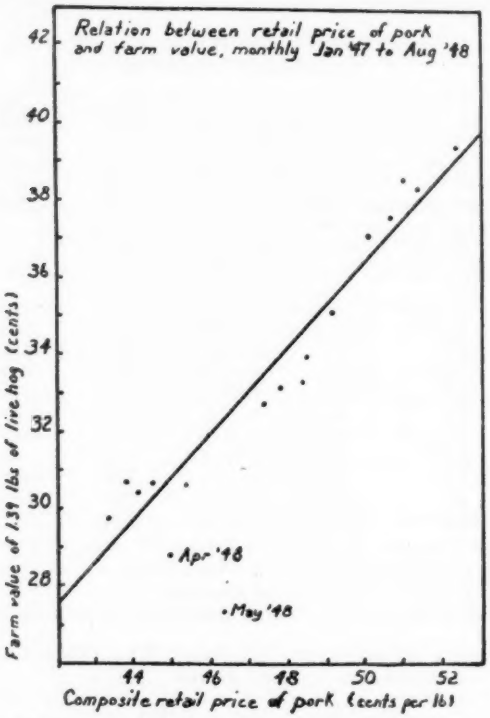
[e] Total pork production less change in cold storage holdings during month.

[f] Source: *The Demand and Price Situation*, USDA.

previous nine years' average. Because of the greater-than-average decline in inventories, it was presumed that the change in quantity of pork at retail due to the strike was less than the change in slaughter. It was observed further that the price of pork did not seem to be related to the monthly changes in slaughter; after the commodity price break in February, the price of pork rose evenly throughout the rest of the season, while slaughter fell during and rose after the strike. This seems to indicate that the elasticity of consumer demand was too great for the retail price to have been affected appreciably by the strike, and it was therefore decided

that the best estimate of what the retail price of pork would have been was that which actually prevailed.

The estimate of the price that would have been received by farmers was made on the assumption that the usual relationship between the retail price and the price received by farmers would have continued had it not been for the strike. In Figure 2, a least-



SOURCE: The Demand and Price Situation

FIG. 2

squares line is fitted to this relationship using monthly data from January, 1947 to August, 1948 with the exception of the strike months. The extreme deviation from the line during April and May was attributed to the strike. Since retail prices were not considered to have been affected by the strike, price received was estimated as the value on the fitted line corresponding to prevailing retail price. This led to estimated price changes attributable to the strike of about seven percent for April and 15 percent for May.

Estimated Quantity: A. *Distribution-of-Slaughter Method.* Table II shows the monthly percentage distribution of yearly hog slaughter for the crop years 1947–48, 1940–41 (the year whose distribution seems closer to 1947–48 than any other recent year), and the past 17-years' average. April and May of 1948 are lower than the corresponding months of the latter two series, while June is higher. This was taken as an indication that hogs were held over till June which would otherwise have been marketed during the strike

TABLE II. HOGS: PERCENTAGE DISTRIBUTION OF YEARLY SLAUGHTER

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
1947–48[a]	8.5	11.1	12.7	10.9	8.0	8.0	7.4	7.6	8.4	6.2	5.1	6.1
1940–41[b]	9.3	11.3	12.6	9.4	7.8	8.1	7.9	8.4	7.0	6.3	5.8	6.1
17 year average (1930–47)[b]	8.0	10.1	11.4	11.0	8.4	8.0	7.8	8.3	7.8	7.0	6.2	6.1
Estimate of 1947–48 without strike						8.0	7.8	8.3	7.3			

[a] Percentages of total commercial slaughter. Source: *Livestock Slaughter by States.*
[b] Source: *Livestock Market News, Statistics and Related Data, 1947,* page 39. Data are for federally inspected slaughter; data for total commercial slaughter is unavailable before 1946.

Standard deviation of 47–48 about 17-yr. average = 0.7
April difference between 47–48 about 17-yr. average = 0.4

Standard deviation of 47–48 about 40–41 = 0.7
April difference between 47–48 and 40–41 = 0.5

months. On the assumption that the strike did not change the total number of hogs marketed during the year but only affected the distribution between months, the 1948 series was adjusted as shown in Table II. The figure for March was not changed, since advance notice of the strike seems to have caused a noticeable bulge in marketings in the first two weeks of March, and this was assumed to have compensated for the decrease in the last two weeks of the month. This also seems justified since the total for March, 1948 is the same as the 17-year average for March. The April and May estimates were made to conform with the 17-year average, and June was adjusted so as to leave the total for the year unaffected.

It may appear questionable to have used such an estimate because of the fact that the difference in each case in April between 1948 and the other series is less than the standard deviation for all months of 1947–48 about the other series. This suggests that the observed difference in April is not significant, for it is well within the range which might have been expected even in the absence of the strike. Another possible limitation arises because the adjustments were made arbitrarily, while the seasonal pattern of hog

marketings is generally thought to depend on how profitable it is to feed hogs to heavier weights. This profitability will in turn depend on the hog-corn ratio and the discount which must be taken on heavier hogs. In attempting to secure an estimate of quantity which would take these into account, regressions of monthly weights for past years on the hog-corn ratio and the weight discount were taken, but these gave results for 1947–48 which clearly contradicted observed weight and which consequently were not employed in the analysis.

Estimated Quantity: B. *Average-Weight Method.* Weights of hogs marketed show substantially more seasonal regularity than does the seasonal pattern of number of head slaughtered, and the data in Table III suggested an alternative way of estimating the change

TABLE III. AVERAGE WEIGHT OF BARROWS AND GILTS[a]

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1947–48	219	221	232	249	257	257	252	259	275	254	237	225
1937–46 Average change in weight from previous month	−5	+6	+7	+6	+3	+3	0	−1	−3	−2	−5	−9
Estimated weight in absence of strike[b]					257	260	260	259	256	254		

[a] Source: *Livestock Market News, Statistics and Related Data*, and *The National Provisioner*.
[b] Average change in weight applied to February.

in marketings due to the strike. One of the most noticeable ways in which 1948 differed from other years was the exceedingly high June average weight of barrows and gilts. This was taken as another indication that farmers marketed hogs in June which otherwise would have been sold during the strike months.

Estimates of what weights would have been during the strike months were made by extrapolating the weight for February according to the average change in weight from month to month for 1937–46. This was done on the assumption that the forces which determine market weights—such as the hog-corn ratio, the discount, or other factors not specifically known—would have continued during the strike with only the usual seasonal changes.

Comparison of the estimates for March, April, May, and June with the weights which actually prevailed led to the conclusion that the strike may have caused the weights for March and April to be lower than they would have been, but that the difference between the actual and estimated weights (−3 for March and −8 for April)

was not great enough to establish this definitely. The average weight in June, however, was the highest recorded since the series on barrows and gilts was established in 1938 and is 19 pounds above the estimate for that month. It was concluded that this could not have been due to chance alone and that the June figure was higher due to hogs held over from the strike months.

An estimate of how many such hogs were held over was obtained as follows: The hogs which were marketed in June were considered to be composed of two groups, (1) those that would have been marketed in June regardless of the strike, and (2) those which would have been marketed in April and May[6] but were held over. The observed average weight in June (call it W_0) is then the weighted average weights (W_1 and W_2). Letting N_0 be the total number of hogs and N_1 and N_2 be the numbers of hogs in the respective weight groups, we have two equations:

$$N_0 = N_1 + N_2$$

$$W_0 = \frac{N_1W_1 + N_2W_2}{N_0}$$

N_0 and W_0 are observed and if W_1 and W_2 are estimated, the equations can be solved for N_1 and N_2, thus giving the estimate of how many hogs had been held over. The extrapolation from February, as shown in Table III, was used as the estimate for W_1, the weight of normal June hogs. An estimate of the weight of the held-over hogs, W_2, was obtained by assuming that they had been held over on the average for six weeks, roughly from May 1 to June 15. The average weight for April–May was 255 pounds. If this was also the average weight of held-over hogs on May 1, and if they gained at the usual rate,[7] their weight was 325 pounds in June.

We thus have N_0=total commercial slaughter in June =5,140,000.[8,9]

$$W_0 = 275, \qquad W_1 = 256, \qquad W_2 = 325.$$

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[6] It was assumed, as before, that the increase in the first part of March cancelled out the decrease in the latter part and thus left that month unaffected.

[7] 50 pounds a month to 300 pounds and 40 pounds a month thereafter.

[8] Source: *Livestock Slaughter by States*, USDA.

[9] The average weight of barrows and gilts was applied to total slaughter. A more precise estimate might have been obtained by allowing for sows; sows, however, were subject to the same influences and would have tended to leave the solution unaffected.

Solving the equations,

$N_1 = 3{,}725{,}000, \quad N_2 = 1{,}415{,}000$ = number of held-over hogs.

The final problem was to allocate the held-over hogs between April and May. It was noted that in nearly every previous year the number slaughtered was greater in May than in April. In the absence of better information on what the difference between April and May would have been in 1948, the held-over hogs were allocated so as to make the relationship conform to the past 17-years' average—a six percent increase from April to May.

In Table IV actual slaughter from March to July is compared with the estimates obtained by the two methods described.

Elasticity of Supply. In computing elasticity, the question arose as to what measure of quantity to use, i.e., whether to use number of head of hogs or total pounds. Since the farmer's important short-run decisions are weight decisions and since demand is ultimately in terms of pounds rather than heads of hogs, a measure which included pounds seemed desirable. But since the operational unit involved is the hog, it would seem desirable also to take account of numbers. These considerations did not affect the elasticities as computed here because of the assumption that the average weight of hogs marketed in April and May was unaffected by the strike.

Elasticities of supply were computed according to the formula

$$\frac{\text{Change in quantity}}{\text{Change in price}} \cdot \frac{\text{Average Price}}{\text{Average Quantity}}.$$

Elasticity of demand. As in the case of supply, measurement of elasticity of demand requires comparison of actual quantity and price with estimates of what quantity and price would have been in the absence of the strike. Estimates of quantity of slaughter were made by the same method for all four groups. Each group considered usually accounts for a fairly stable percentage of the larger

TABLE IV. TOTAL COMMERCIAL SLAUGHTER (1,000 HEAD)

	March	April	May	June	July
Observed[a]	4,831	4,502	4,589	5,139	3,771
Estimated by percentage-distribution method	4,831	4,737	5,041	4,434	3,771
Estimated by average-weight method	4,831	5,100	5,406	3,725	3,771

[a] Source: *Livestock Slaughter by States.*

aggregate of total slaughter, and this percentage was applied to the estimates given in Table IV of what slaughter would have been. There is some seasonal and yearly variation in these percentages.

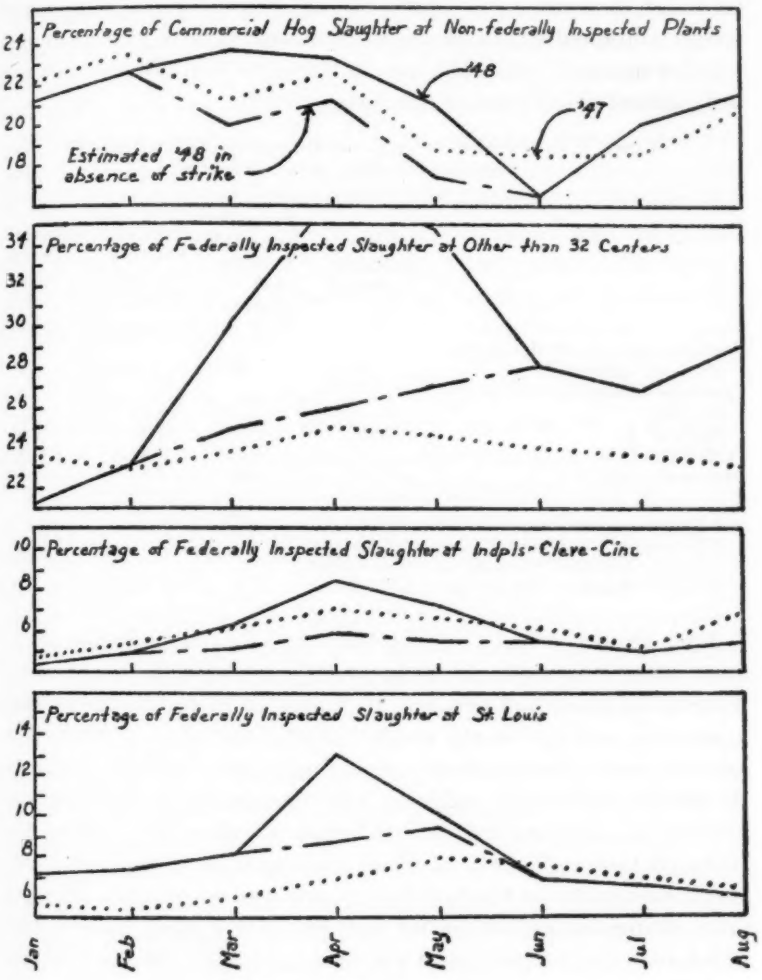

FIG. 3

The yearly level was estimated by observing other months of 1948, and the seasonal movement was estimated from past years. Figure 3 indicates graphically the method by which the various percentages were obtained. Table V gives these estimated percentages for April and the estimates of slaughter derived from them.

These estimates have the disadvantage of not representing groups among which there were no struck plants, which may mean an underestimation of the elasticities. A completely unstruck group for which statistics are compiled was not found, for every important center contained struck plants in some degree. Groups were chosen which contained relatively few, in the hope that the number was insignificant enough not to affect the results.

TABLE V. SLAUGHTER OF SELECTED GROUPS OF MEAT-PACKING ESTABLISHMENTS IN APRIL, 1948

	Non-federally inspected	Federally inspected at other than 32 centers	Federally inspected at Indpls-Clvld-Cinc.	Federally inspected at St. Louis
Percent group usually slaughters of larger aggregate	21.5[a]	26.0[b]	6.0[b]	9.1[b]
Estimate of slaughter in absence of strike:				
Method I	1,095	1,041	240	364.3
Method II	1,018	967	223	338.4
Observed slaughter	1,159[c]	1,237[d]	294[d]	436.2[d]

[a] Percent of total commercial slaughter.
[b] Percent of total federally-inspected slaughter.
[c] Source: *Livestock Slaughter by States*, USDA.
[d] Source: *Livestock Market News*, USDA.

Aside from the fact that the third and fourth estimates are of more interest than the others because they deal with the quantitatively most important demand, they may be more reliable because a separate price estimate was attempted for these groups. The relevant price change when considering supply is price change to the farmer, and includes additional transportation charges incurred because of geographical redistribution of slaughter during the strike. A thorough study of these additional costs was not made, and the estimate for the first two groups was made using the same price change as estimated for farmers. Thus, they have a bias which may not be present in the other estimates. It was thought that if transportation costs caused a part of the decrease in prices received by farmers during the strike, this would be reflected in a differential which was greater than usual between prices to farmers and the market price. This seems to have been the case, for example, for Chicago in April. For the Indianapolis-Cleveland-Cincinnati group, the price at Indianapolis was used; and it was con-

cluded that the differential here was not greater than usual and that therefore the price change for this group was the same as for farmers. The same was true for St. Louis.

Demand elasticities were computed by the same formula as that used for supply. The elasticity of supply of hog marketing services was obtained by using Department of Agriculture margin figures instead of hog prices. The aggregate elasticities were obtained by weighting each group according to the estimated percentages for April. Total slaughter is composed of (1) non-federally inspected (2) federally inspected at other than 32 centers and (3) federally inspected at 32 centers. As indicated, estimates were obtained directly for the first two. The average of Indianapolis-Cleveland-Cincinnati and St. Louis was used as an estimate of the elasticity of the third group.

III

The elasticities obtained in this study are intended to measure short-run response to price changes which can be generalized beyond the strike period and which can be expected to hold for all months of the year. The method that has been used is similar to that used in other attempts to derive empirical demand and supply curves, in that price and quantity during a given time period are taken to represent the intersection of a demand and supply schedule. It is therefore assumed that there is some unique quantity that will be supplied corresponding to every possible price (and similarly for demand), and that the schedules so defined are the ones we are attempting to derive. Even this is only an approximation to reality, since *average* price for the country over the period is taken. This poses the familiar problem encountered whenever we aggregate over time or space as is here done. There are many varying configurations of prices all of which could have the same average and each of these configurations might give rise to different quantities supplied or demanded. Some variation is obtained, then, simply by aggregation, and it must be assumed that this variation is small enough to be neglected.

In this study, only two points on each of the curves have been obtained. This means that nothing can be inferred about their shape, e.g., whether they are curved or linear. As with the problem of aggregation, however, this is a problem encountered in other statistical studies. In many of these, arbitrary assumptions of

shape, such as linearity, must be made without obtaining this information from the data.

Another problem is that of how these curves shift through time. It would be desirable to know if they retain their slope or elasticity, because only in this case could the results validly be generalized to other time periods. We are interested, in other words, in whether the relationship between price and quantity is the same regardless of the position of the curves. Other econometric studies make such an assumption. If can be defended on the grounds that it may offer a useful approximation in the absence of knowledge to the contrary.

A complete model would specify the variables which make the curves shift, e.g., national income, prices of other commodities; and it would specify the mathematical relationship of these variables to the curves. In this study no attempt was made to specify such a model. Both the supply and demand curve undoubtedly shift through the course of the year, but neither the causes nor the extent of these shifts was examined here. One of the possible uses of these elasticities, however, could be in measuring shifts of the curves. This is because if successive price-quantity observations are taken, and if the slopes of the curves passing through these points are known, it is possible to calculate how much each of the curves shifts.

The measures obtained here are not inconsistent with a broader model. In fact, two of its parameters have been specified, namely, the relation between price and quantity in the demand and supply equations. This may offer a convenient check if a broader model is attempted, or an otherwise "unidentifiable" situation may be rendered identifiable. The problem of serial correlation in studying the short run is avoided.

The considerations that have been discussed thus far in this section are encountered in some degree in all attempts to derive market supply and demand curves. A more thorough discussion of these is found through the long history of such endeavors and especially in the work of Koopmans, Marschak and others at the Cowles Commission in recent years.

There remain some problems which are more or less special to this study. It is not possible, for instance, to compute quantitative measures of the reliability of the results. Ordinarily, when a statistical result is obtained, limits are set and a probability given that

the true figure lies between these limits. The figures obtained here are the result of a series of point estimates, and although the two alternative figures given in each case do set limits, no probabilities were assigned.

A more important problem is that of whether the two points in each case do lie—as assumed—on the same demand (or supply) curve. It has been noted that the position of these curves will depend on other variables not specified in this study. Because we are dealing with the short-run, one important factor that determines their position is the state of buyers' and sellers' expectations. The necessary assumption that the supply curve did not shift as a result of the strike would be fallacious if the strike altered farmers' expectations so as to change the aggregate of their previous decisions on the most profitable pattern of future marketings. In this case the observed price-quantity during the strike would lie on a different supply curve from the one which would have prevailed in the absence of the strike and on which the estimated price-quantity lies. Similarly the strike might have altered the demand of the various groups of unstruck packers, in which case the two observations for each of these groups would lie on different curves. The fact, however, that the strike was believed to be a temporary phenomenon suggests that the price fall did not affect expectations greatly. Thus, while there is the possibility that the two points in each case do not lie on the same curve, the error due to this may not be large.

Another question is that of whether measurement of elasticities was taken in relevant ranges of the respective curves. If measurement were taken over extremely wide ranges, there might be reason to expect a result different from that when measuring along segments where buyers and sellers usually operate. It is the latter measure which is desirable if the results of this study are to be applied to other times and other conditions. Price range may be considered first. The normal postwar autumn price decline seems to be about $3.00 per hundred pounds, and there was a fall of $5.00 during the price break of February, 1948. The change in price during the strike, about $2.00, does not therefore seem unusual. As for changes in quantity, the high weights of held-over hogs is evidence that farmers held hogs much longer than they usually do; but this would not apply to the estimates for April because held-over hogs would not yet have reached the extraordinary weights

they reached by June. The rate of slaughter of unstruck packers, although large for that time of year, was in the range reached in the two previous seasonal peaks. Plants whose labor forces do not vary seasonally were therefore evidently not operating at unusual outputs. To the extent that plants with variable labor forces could not or did not hire additional labor as readily as in seasonal production peaks, their elasticity of demand may have been less than usual.

IV

In closing, three possible uses of the results obtained here will be noted. The first was referred to above when it was stated that knowledge of the elasticities permits study of the effects of other variables on demand and supply. The shifts in both of the curves could be calculated and an attempt made to correlate these with variables which are believed to determine the position of the curves. This work has not been undertaken. Unfortunately, the wide limits to the elasticities restricts the reliability of further empirical work based on them.

A second use of these estimates is in the study of changes in prices, quantities, and receipts to farmers and slaughterers as a result of short-run changes. The sharp decline in hog prices during the strike indicates the extent to which the farmer is affected by unusual disturbances in the marketing sector. If the measures derived in this study are accepted, however, generalizations are possible with respect to more ordinary economic fluctuations. To illustrate this, the effect of short-run fluctuations in the demand for pork on the price of hogs and on the price of slaughtering services will be considered briefly. Seasonal fluctuations in consumer demand for meat, fluctuations in demand due to changes in national income, and changes in the demand for meat for storage due to changing expectations will affect slaughtering and hog marketing. If the price of hogs is very sensitive to changes in the demand for pork, the farmer faces great uncertainty about future price and hence there may be significant costs of uncertainty in his attempts to adjust to this. If, on the other hand, most of the change is absorbed by the slaughtering sector, the farmer will be protected from these fluctuations and most of the price uncertainty will impinge on slaughterers. This question may be investigated by use of the following equations.

1) $q=f_1(p_m;\ X)$: the demand for pork, including processor de-

mand for storage, where q = the quantity of slaughter,[10] p_m = the price of pork, and X = a set of unspecified variables which determines the position of the demand curve.

2) $q = f_2(p_s; Y)$: the supply of slaughtering services, where $p_s = p_m - p_h$ = the "margin" between the price of pork and the price of hogs, and Y = the set of unspecified variables which determines the position of the curve.

3) $q = f_3(p_h : Z)$; the supply of hogs, where p_h = price of hogs and Z = the set of unspecified variables which determines the position of the curve.

For given values of the variables included in X, Y, and Z, this becomes a set of three equations from which may be determined the quantity of slaughter, the price of pork, and the price of hogs. The fluctuations we wish to study are changes in the variables included in X. To examine their effect, the equations can be differentiated with respect to this set of variables. The following expressions are obtained.

$$\frac{dp_h/dX}{dp_m/dX} = \frac{(\alpha_1 - \alpha_2)\beta_3 dZ/dX - \alpha_1\beta_2 dY/dX + \beta_1\alpha_2}{-\alpha_1\beta_3 dZ/dX - \alpha_3\beta_2 dY/dX + \beta_1(\alpha_2 + \alpha_3)}$$

$$\frac{dp_s/dX}{dp_m/dX} = \frac{-\alpha_1\beta_3 dZ/dX + (\alpha_1 - \alpha_3)\beta_2 dY/dX + \beta_1\alpha_3}{-\alpha_2\beta_3 dZ/dX - \alpha_3\beta_2 dY/dX + \beta_1(\alpha_2 + \alpha_3)}$$

where

$$\alpha_1 = \partial f_1/\partial p_m, \qquad \beta_1 = \partial f_1/\partial X,$$
$$\alpha_2 = \partial f_2/\partial p_s, \qquad \beta_2 = \partial f_2/\partial Y,$$
$$\alpha_3 = \partial f_3/\partial p_h, \qquad \beta_3 = df_3/dZ.$$

The total change in the price of pork due to a shift in demand will be absorbed both by a change in the price of hogs and a change in the price of slaughtering services. The first expression above shows the proportion of the change which is absorbed by a change in the price of hogs, and the second expression shows the proportion absorbed by a change in the price of slaughtering services.

Now consider the derivatives dZ/dX and dY/dX. These meas-

[10] The quantity of slaughter, which is common to all three equations, may be in terms either of hogs or pork. If it is in hogs, the price of pork must be measured in hog-equivalents. If it is in terms of pork, the price of hogs must be in pork-equivalents. Either method will lead to the same final result.

ure the extent to which changes in X are accompanied by changes in Z and Y, which—as was noted—determine the position of the farmer supply curve and the slaughterer curve respectively. β_3 and β_2 measure the extent to which changes in Z and Y shift these curves. We may expect that X, Y and Z contain some of the same variables, especially since changes in expectations will not be limited to one group. If it is assumed, however, that both farmers and slaughterers are governed more largely by technological considerations than are those who buy meat, there is reason to believe that $\beta_3\ dZ/dX$ and $\beta_2\ dY/dX$ may be small. Neglecting these terms, then, the above expression become

$$\frac{dp_h/dX}{dp_m/dX} = \frac{\alpha_2}{\alpha_2 + \alpha_3} = \frac{1}{1 + \eta/\gamma} \qquad \frac{dp_s/dX}{dp_m/dX} = \frac{\alpha_3}{\alpha_2 + \alpha_3} = \frac{1}{1 + \gamma/\eta}$$

where η is the elasticity of supply of hogs and γ is the elasticity of demand for hogs.

The result thus emerges that price vulnerability to external fluctuations in the economy depends on the ratio of the elasticities of supply and demand in the hog market. An elasticity of supply which is high relative to the demand elasticity would protect the farmer from price variation and cause the brunt of the variation to fall on slaughterers, and conversely a supply elasticity low relative to demand elasticity would mean that changes were passed on to the farmer readily. Returning now to the empirical work done in this study, η seems to be in the neighborhood of one and γ appears to be about three. Substituting these values into the expressions that have been obtained, it can be concluded that when a change occurs in the demand for pork, roughly one-fourth of the resultant price change is absorbed by the slaughtering sector and three fourths of it is transmitted to the farmer. We might therefore expect that there are large costs of uncertainty in hog production and that hog producers have much to gain from greater short-run stability in the economy.

The example above is intended merely to be suggestive of the way in which the elasticities derived here might be used to throw light on particular problems that may deserve study. Price variation alone has been dealt with, with no consideration of the concomitant changes in quantity and income of farmers and slaughterers. Only shifts in pork demand have been considered. It would also

be possible to study effects of shifts in the other two curves. For some problems, a different set of equations might be relevant.

Aside from using the results of this study in making inferences about the hog market, there is a third and perhaps more important way in which the work described here is useful. It is an example of the way in which shocks in the economy may be studied to obtain information that might be too costly to obtain by other methods, and it suggests that this method might be fruitfully applied to other situations. Other strikes, the imposition or lifting of price controls, and the imposition or lifting of an excise tax might provide such opportunities. The method consists in watching the reaction of firms to disturbances of known origin. A prerequisite to its application is that prediction is possible of the course of events had the disturbance not occurred. This is not prediction in the usual sense, for the estimation is done in view of events both before and after the disturbance. The kind of problems which are likely to arise with the use of this method has been suggested, but the particular situation being studied and the information being sought will determine the way in which these should be handled. There has, therefore, been no effort to describe an exact procedure to be followed or to make a comprehensive evaluation of the method.

NOTES

THE PROBLEM OF RELOCATING FAMILIES ON THE FORT BERTHOLD INDIAN RESERVATION

THE development of the great Missouri Basin oriented in the Missouri River and its tributaries from St. Louis west through the Great Plains region to the Rocky Mountains is designed to improve the material well-being of the American community by bettering our waterways, by increasing our measures to control devastating floods, by making our agriculture more secure as irrigation is extended to arid sections of the region, and by enlarging the amount of the "new democratic physical power of the new age," hydro-electric energy.

For this creation of new wealth some few must be called upon to sacrifice for the good of the many. To most of those who are giving way to the new, it means only material readjustment—selling their present farms, ranches, and town properties and re-establishing their businesses elsewhere. While disturbing, the experience of moving from their present environs should not prove overwhelming. A high percentage moved to their present locations from some other place within their present lifetimes; they are "accustomed to moving."

On the other hand, in the wake of this development in South Dakota, North Dakota, and Montana are several tribes of Indians who will experience serious disruption to their way of life by the "taking" of their lands for reservoirs. For some, like the Sioux in South Dakota, it will in some ways add to their material resources through possible improvements to remaining lands, and their use that will follow, and by cheap electric power that will become available; their "way of life" as social aggregates should result in improvement in the over-all. This may not be true for three small tribes in North Dakota whose homes are on the Ft. Berthold Reservation, which is situated behind the gigantic Garrison Dam now under construction.

These three tribes, Gros Ventres, Mandan, and Arikara, comprise two thousand souls, 357 families. The Garrison Reservoir will enter their reservation of 583,000 acres about 20 miles north of the dam site. It will cut through the reservation (which lies on both sides of the Missouri River) for about 80 miles. About 153,000

acres will be flooded. The 430,000 acres remaining will be separated into five distinct segments by the lake that will be formed. This is the area, a treeless prairie land that is hilly in the main, to which 298 families will move to set up their new homes.

For the 153,000 acres that the United States is "taking," the tribes are being paid $5,105,625; this amount is already appropriated by Congress. An additional $7 million is being authorized by the Congress for payment to the Indians. The former sum is to pay for the appraised values of land and properties individually and tribally owned. The latter amount is to compensate for damages to tribal life and other intangibles over and above those physically assessable. These are the surface statistics. This evaluation of the physical together with the lump sum for severance to cover intangibles would appear, superficially, to be an excellent "price" in our economy which we attempt to keep geared to a "free and open market."

Yet even so large a sum as $6,000 per capita can "evaporate," literally overnight, if used only for consumption purposes and not put to economically sound productive use. And the complexity of our present day economy demands a well-balanced way of life necessitating a high degree of managerial ability constantly focused on the razor's edge that slices the proceeds of human effort between receipts and expenditures. So long as the former is greater than the latter the individual or the group maintains a healthy survival. When such a condition does not prevail impoverishment sets in and the total of national well-being is reduced accordingly.

Change is not a new experience for the Fort Berthold people. Since their first treaty at Laramie, Wyoming, with the United States in 1851 when their present reservation was established with 12.5 million acres, they have relinquished title to an area greater than that of the states of Massachusetts and New Hampshire combined. The Arikaras, over the generations, migrated from Central America, first to what is now St. Louis, and then up the Missouri River. They brought with them corn, beans, tobacco, sunflowers, squash, and pumpkins. These they adapted to the increasingly rigorous climate as they went north. The Mandans and Gros Ventres developed a hunting economy with the prairie bison as the basis. About a hundred years ago the cultures and their economies were fused through a federation of these three ethnic groups. They organized a village life in the Missouri Valley. It was the outer

edges radiating from this village center that they consented successively to give up, but always they clung tenaciously to their river valley homelands. For here existed the core of their material culture which was the basis for their moral and emotional way of life. The United States Government, in the climate of the "homestead era," disintegrated their homogeneous communal village life in 1885, but they met the new challenge of the individualized American family economy, for they were still permitted to live in the fertile valley lands of their forefathers. The river forests with their deer, pheasants, beaver, and wild fruits in abundance remained for their use to develop their present high-grade Hereford livestock economy. The easily accessible lignite coal outcropping along the banks of the river remained to be used to warm their hearths through the long and harsh winter months. The sacred places and the revered family burying grounds could still be seen and visited for ceremonial veneration.

Now, for the first time in their age-long history, this material core, this heart, of their culture must disappear in the sea and they must of necessity readjust their way of life in a new setting on the five separate remaining segments of their reservation land. Congress has not been unmindful of the possibly devastating effects. The Bureau of Indian Affairs is particularly aware of the danger, if a sound process of reintegration is not carried out; a program that will restore a balanced way of life capable of meeting the demands of our times. The Fort Berthold people themselves are conscious of what can and might take place. All are groping for a satisfactory solution.

Will our knowledge of agricultural economics, rural sociology, social psychology, cultural anthropology, and public administration be applied to the Fort Berthold people to meet this new challenge in an uncharted venture so that they too may in the end enjoy the benefits of this great new development of the Missouri River Basin? The Bureau of Indian Affairs is exerting every effort to effect such an application.

BEN REIFEL

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COMPLEMENTARY TOOLS OF FARM PLANNING

FARM planning is used here in the sense of fairly comprehensive planning on the part of anyone toward maximizing net income on an individual farm. The facilitation of this kind of planning is the immediate objective of most extension work in farm management; it is a principal objective of most elementary and some advanced courses in farm management at the college level. Most of the comments here grow out of my farm management teaching experience the last two years, after some exposure as a student to different farm management approaches. I believe, however, that the problems are to a large extent common to extension, to individual farmers' decisions, or any other farm management work dealing with the objective of maximum income on individual farms.

By far the most widely used farm management tools for implementing this objective are the direct comparison or efficiency factor method and the budgeting, synthetic, or substitution method. Apparently in most textbooks, bulletins, and courses, these tend to be handled as alternative or even competing methods. As a result of trying to present, evaluate, and apply both methods I have tentatively arrived at these main elements in teaching how to manage a farm:

1. Provision of tools for choosing an individual's most profitable alternative;
2. Suggestion of the more important general and specific alternatives from which the choice is to be made.

The thesis of this paper is that the budgeting and direct comparison methods are each fairly well suited to one of these steps but not to the other; therefore that they are best used as complementary methods.

Perhaps this thesis can best be developed by applying the direct comparison and budgeting methods to the principal steps of farm planning as defined above. I shall assume that budgeting and direct comparison as practical tools should implement or at least not conflict with relevant theory, and that the theory must stand the test of application. The planning steps meant are those of enterprise selection, organization for production, and operational planning. These are indicated for discussion purposes and are not presumed to be entirely consecutive or even independent in practice.

Assuming that the farmer is located within a general area, the

first planning step is enterprise selection—what to produce. The basic theory here is that of comparative advantage *at the individual farm level.* The farmer should produce those things for which he has the greatest advantage relative to other products. The elements necessary to arrive at the correct answer are the relative market opportunities, the production "requirements" and techniques of the possible enterprises, and the resources at the particular farmer's command. Now, how do our farm planning tools handle this problem?

Direct comparison suggests that the enterprises of the most profitable farms are the best; it pictures the average enterprise composition of the high income farmers and tries to show the effect different enterprises have had on income. Whether the average enterprise composition of the high income farmers is a good model for the particular farmer depends on whether his market opportunities, and especially his several resources, are sufficiently similar to those of the high income group. A good interpreter probably makes allowances for such differences, but the method itself does not guarantee these adaptations. This defect could, and sometimes probably is, partially overcome by describing enterprises on farms representing different resource situations, such as small, medium, and large farms. These descriptions of enterprises could be suggestive of enterprise alternatives to be considered in detail for adaptation to the individual farmer's situation.

The essence of the budgeting approach to any farm management problem is that the farmer tries to decide what he should do by actually figuring through to estimate the effects of alternative actions on his net income. If he does this, he must take market opportunities into account through price estimates, and he must take techniques and resources into account through physical input-output specifications and estimates.

Budgeting is thus well adapted to the job of considering individual resources and opportunities. Persons who have had training, broad observation, and good judgment may be able to select the more likely alternatives for budgeting from their informal observation. Direct comparison provides *organized* observation along the same line. If it attempts to present *one* best enterprise combination for all farms it does not really furnish alternatives, but it may provide a starting place from which the farm management man may speculate as to how enterprises should be modified to fit some-

what different resources. To the extent that direct comparison presents second best enterprise combinations or enterprises for different resources, the suggested alternatives for budgeting are increased.

The second specified general step in farm planning, that of organizing to produce, includes the problems of "building and equipping the plant" and organizing it for production; it includes, for example, questions of size of farm, kind and amount of equipment and labor—usually with at least temporarily limited capital and management and sometimes with some other factors more or less fixed. The basic theory is that of equalizing marginal net revenue from all available resources along all possible uses, and it includes recognition of fixed and variable costs.

Direct comparison approaches the organization problem in terms of the number of acres, number of cows, amount of labor, amount of total capital, etc., on the high, low, and medium income farms. This tells the farmer how certain features of organization differ from the same features under less profitable organization. There is nothing in the method (although there may be in its interpretation) to indicate how farmers with less total capital or with some relatively fixed resources are to maximize their incomes. It is true that, with the ideal organization before him, the farmer may in time be able to move in that direction, but in the shorter period his job is to organize as effectively as possible the resources at his command. This assumption in the method of similar resources extends to management, for it is inferred that *if* the particular farmer had the size of farm, etc., that the high income farmers have, he would manage it so as to have a similar income. Budgeting has the danger of going almost as far in the other direction—management is usually spoken of as the least variable factor, which it probably *is* at a given time but may not be over any considerable period.

Budgeting theoretically offers a practical means of carrying out the equalization of marginal net revenue from all resources. Human beings, however, are not capable of taking raw, undifferentiated resources and moulding them into entirely new productive combinations. Neither is budgeting well adapted to comparing an infinite number of possibilities. Actually budgeting in practice is more a matter of comparing a few observed combinations or of testing relatively limited variations from one observed combination. In organization, as in enterprise selection, we can get some possible

combinations from informal observation, but organized observation may do a better job, especially for people whose experience has been somewhat limited—this probably includes most students and farmers. The tendency of direct comparison has been to show a single (average) best combination. This gives a point of departure for considering variations, but it would be more helpful if not *one best* combination for *one resource situation* but *the better* combinations for *the more common resource situations* were presented. This, of course, is done to some extent by making the direct comparison within type-of-farming areas. But this presumes too much uniformity within areas; it is an *area* application of comparative advantage where a *farm* application is needed.

A by-product of direct comparison research and extension work, the knowledge of ways individual farmers have solved organization problems, is probably more suggestive of alternatives than is the formal product of the method. It amounts to unorganized and unrecorded case studies. One wonders whether, after the broadest direct comparison studies, the more complex problems of farm management might better be explored through case studies. There is some question as to whether the usual research methods back of direct comparison can handle the complex problem of sorting out the principal alternative combinations for various resource situations. Case studies of different resource situations aided by theory and general knowledge of farm management might be more productive of explaining the superficial relationships and suggesting the real alternatives.

The third indicated step in farm planning is operational planning. It concerns those decisions as to how production is to be most profitably carried out while taking the producing plant as given. The theory again is that of equalizing marginal net returns in such a way that no adjustments (in this case short-run adjustments) can be made which will add to net income. However, as compared with organizational planning, there may be a greater possibility of pushing variable inputs to the point where marginal cash cost equals marginal returns. Another difference is that the farmer encounters more frequent problems of opportunity cost.

Probably the aspect of operation which receives most attention is that of most profitable level of output. What should the individual farmer plan for in the way of crop yields, animal production, labor output, etc.? How he can tell the most profitable level for his situation is the farm planning problem.

Direct comparison handles the level of production problem by setting up the levels of the higher income farmers as desirable goals. From the theory standpoint this is not good, since it does not recognize differences in kind, amount, and quality of resources, changes in prices and the consequent different optimum levels of output. It may even lead to such doubtful advice, as seen in recent farm magazines, that farmers should use more fertilizer as prices of farm products fall. However, analysis of *how* the higher income farmers achieve their higher rates of production should indicate what cost items were involved. Budgeting could then estimate the effect of these cost items in a particular farm situation—provided we have enough input-output data.

Perhaps budget-minded farm management people are devoting too much time to the problem of determining optimum levels for continuous variable inputs and outputs. Within a fairly wide range the effect of different amounts of fertilizer or feed may not have enough influence on net income to warrant the time of economists and farmers necessary to determine the exact optimum. There is the additional difficulty of determining in what situations we are warranted in taking one kind of cost as fixed and another variable. For instance, are hogs truly fixed and corn truly variable to the extent that the farmers should feed up to the point where marginal cost in additional feed value equals marginal revenue in additional pork value? Some of the how, when, and whether production questions may be more important. Some of these involve alternative cash costs, some involve only opportunity cost in the use of the farmer's time. Experiments from the production fields such as agronomy and animal husbandry, input-output studies of equipment, and work simplification studies supply both some of the alternatives and some of the data for budgeting them. But how these are adapted to farm situations and the individual production methods or tricks that farmers work out to suit their particular situations or turn of mind may have considerable effect on their net income. The discovery of these, perhaps by working back toward explanations of the more superficial relationships of direct comparison, may suggest alternatives to be tested for a particular farm by budgeting.

Application of the principal applied tools of budgeting and direct comparison leads to the conclusion that each has certain strengths and weaknesses for planning toward maximum net income on individual farms. Fortunately one tends to be strong where the

other is weak. Direct comparison is not well suited to production theory and it does not consider adequately differences in resources; consequently it is not a satisfactory tool for choosing the most profitable of a farmer's alternatives except in a very limited way. Budgeting does provide a tool for implementing theory and for choosing among alternatives. It does not, however, indicate what the alternatives are. Direct comparison has usually set up one situation from which budgeting variations can be made. Analysis of the reasons for differences between high and low income farms, perhaps by traditional direct comparison studies, perhaps by case studies aided by theory and intelligence, can provide more alternatives. Budgeting needs these alternatives, first, to work at all; and second, to keep closer to real problems.

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CHANGES IN TIME OF STARTING CHICKS

SOME of the technological changes that have taken place in recent years in commercial poultry farming in New York State are: using artificial lights, keeping all-pullet flocks, sexing of chicks, developing cross-bred and hybrid birds, vaccinating against various diseases, and starting chicks earlier in the year. Some of these changes, such as use of artificial lights on the layers, spread rapidly throughout the industry. This was probably due to the ease with which lights could be provided, and the fact that poultrymen could quickly observe the beneficial effects of more hours of light. Other developments, such as the starting of chicks earlier in the year, have been accepted more slowly because of the production problems involved, the uncertainty as to the effect on profits, and the inability to observe results of the shift until several months later. Then too, there has been considerable uncertainty within the industry regarding when the chicks should be started to be "early."

The purposes of this article are to: (1) determine the extent to which commercial poultrymen in New York State are starting chicks earlier in the year, (2) appraise the effect of shifts in starting date on egg prices, (3) estimate the possibilities for further shifts in the starting date for chicks, and (4) illustrate how economic research opens up new areas of research for production de-

partments and how the work of the two groups of researchers may be coordinated to solve a problem.

During the past 20 years, there has been a decided shift on the part of commercial poultrymen to starting chicks earlier in the year (Table I). In New York, farm management studies made in the late twenties and early thirties showed that one third of the chicks were started in March, with nearly as many started in April. Less than 10 percent were started before March.

TABLE I. PROPORTION OF CHICKS STARTED FOR REARING BY MONTHS, NEW YORK

Month	Six year period 1926, 1929–1933[a]	1941[b]	1947[c]
	Percent	*Percent*	*Percent*
October	0.8	1.0	0.0
November		0.1	1.0
December		0.1	2.1
January		6.6	12.6
February	9.3	17.4	18.8
March	33.8	24.2	25.1
April	29.8	29.5	24.8
May	22.2	15.7	14.0
June	4.5	2.8	1.2
July–Sept.	0.1	2.6	0.4

[a] *Economic Studies of Poultry Farming in New York.* E. G. Misner and A. T. M. Lee, Cornell Univ. Agr. Sta. Bul. 684, December, 1937.

[b] *Costs of Incubation and Rearing on Commercial Poultry Farms.* L. B. Darrah, Cornell Univ. Agr. Exp. Sta. Bul. 797, June, 1943.

[c] *An Economic Analysis of New York Production of Eggs.* C. D. Kearl. Doctorate Thesis in Cornell University Library.

In 1941, April was the most important month with about the same proportion of all chicks as 10 years earlier. The proportion started in May had declined nearly one third from that for the first studies, while the proportion started in February nearly doubled. Also, of real significance was the fact that nearly seven percent of the chicks were started in January.

A study in 1947 showed that March and April were of about equal importance, with one fourth of the chicks started in each month. The increase from 1941 to 1947 in the proportion of chicks started in February was about equal to the decrease in the proportion started in May. The proportion started in January doubled from the January 1941 level; and for the first time December became of greater importance than June, July, August, and September combined.

The shift in starting date of chicks raised for egg production, the trend to keeping a higher proportion of pullets in laying flocks, higher rates of egg production, and other factors have (1) caused the period of seasonally highest prices to come earlier in the fall, and (2) reduced considerably the amount of seasonal variation in egg prices.

During the 1920's, the peak in egg prices occurred in November, with December nearly as high. In recent years, highest prices have been received in October, while those for September and November were almost as high (Table II). At the same time, the period of seasonally high egg prices has changed from a high sharp peak lasting for a month or so to a plateau with seasonally high prices extending for about a five-month period, August through December.

TABLE II. INDEX OF SEASONAL VARIATION, NEW YORK STATE FARM PRICE OF EGGS

Month	1920–24	1925–29	1930–34	1935–39	1940–44	1945–48
January	126	118	116	99	94	97
February	106	101	91	89	86	84
March	82	80	80	81	80	83
April	65	69	73	77	79	83
May	66	68	69	78	79	85
June	69	73	70	82	82	90
July	76	81	86	95	97	101
August	90	92	98	106	109	111
September	102	106	114	116	111	117
October	121	122	131	126	125	119
November	149	148	147	132	130	137
December	147	142	127	116	125	112

The practice of starting chicks earlier is economically sound. In 1946–47 New York State poultrymen who started light breed chicks in January and February made profits of 8.0 cents per dozen eggs, while those who started their chicks in March, April, and May made profits of 2.8 cents. The return per hour of labor for the farmers with early chicks was $1.19, as compared with $0.62 for those with late chicks.

These results suggest that early starting of chicks is usually profitable, but do not answer the question of how early chicks should be started. To appraise this query, an analysis was made of an actual case on a poultry farm included in the 1946–47 poultry study. The monthly data for this farm on a physical input-output basis were kept the same in total but were adjusted as they would

have been if the pullets had been housed in each of the 12 months of the year.[1] The prices used were those actually prevailing in each of the calendar months. Estimated changes in costs and returns were thus the result solely of the rearrangement of physical inputs and outputs and the effect of the same seasonal price pattern. This procedure assumes that the month of starting chicks makes no difference in rates of lay, feed consumption, and other physical factors on an annual basis.

The total cost varied somewhat with the adjustment of the data to various months of housing pullets, because different amounts of feed were consumed every month, the prices of feed varied during the year, and the depreciation cost was changed for the various months of housing by selling culls at different prices. There was, however, no tendency to have widely different costs regardless of housing dates (Table III). The maximum difference was $244, between the high cost month of housing pullets, August, and the low cost month, October.

TABLE III. EFFECTS ON COSTS, RETURNS, AND PROFITS OF ADJUSTING SEASON OF HOUSING PULLETS
New York, 1946–47

Month of housing	Total cost	Returns					Profit
		Large eggs	Medium eggs	Other eggs	Other returns	Total	
September	$6,779	$7,077	$2,088	$623	$108	$ 9,901	$3,122
October	6,596	7,262	2,038	579	108	9,987	3,391
November	6,673	7,451	2,021	605	108	10,185	3,512
December	6,792	7,531	2,048	650	108	10,337	3,545
January	6,733	7,552	2,100	669	108	10,429	3,696
February	6,762	7,543	2,128	689	108	10,468	3,706
March	6,763	7,522	2,175	706	108	10,511	3,748
April	6,809	7,535	2,285	690	108	10,618	3,809
May	6,863	7,309	2,394	693	108	10,504	3,668
June	6,736	7,194	2,405	712	108	10,419	3,683
July	6,713	7,082	2,322	689	108	10,201	3,488
August	6,840	7,006	2,200	640	108	9,954	3,114

The returns, however, showed a definite tendency to increase from a low with fall housing to a high with spring housing. September was the low month, with returns of $9,901, and April was

[1] Adapted from *Seasonal Costs and Returns in Producing Eggs, New York, 1946–47*, by C. D. Kearl, A.E. 713, published by the Department of Agricultural Economics, Cornell University, in cooperation with the Bureau of Agricultural Economics.

high with $10,618. This was an increase of $717. Housing in the months of February, March, and May gave total returns of about $10,500.

Most of the increase in total returns came from the sale of large and medium eggs at higher prices than in other months. Returns other than those from the sale of eggs were kept the same. The increase in returns for large eggs between the low with August housing of $7,006, and the high for January housing of $7,552, amounted to $546. For the medium eggs the lowest return was with October housing and the highest with housing in June. In each case the returns were high because the month of high production of these two sizes of eggs came at the time when the prices for such sizes were seasonally highest. Considering both large and mediums, April housing gave the highest returns for such eggs, $9,820, as well as for all eggs.

The profit was highest, $3,809, with April housing. Regardless of whether they were housed earlier or later, the profit declined from the April high to a low with August and September housing of about $3,120. This difference in profits, about $700, was primarily due to variations in returns for eggs rather than those in costs.

Since April housing of pullets, based on the assumptions previously discussed, was shown to be most profitable, a suggested system of operation would be to start the chicks in November and put them in the laying house the latter part of April. During the period in which they would be producing a relatively high proportion of medium and pullet eggs, prices for such eggs would be higher relative to large eggs than in the fall months when pullets usually come into production. The flock would reach a high rate of lay and would be producing mostly large eggs during the summer and fall when egg prices are seasonally high, and when the differentials between the price of large eggs and those of the other sizes are greatest.

Although the indications are that such a plan would increase profits considerably over that which might be expected for pullet flocks started in other seasons, some important questions were raised as to its practicableness. They were:

(1) What will be the effect on the health and mortality of the chicks started so early?

(2) Will hens from the pullets raised in the winter have the same vigor and health as those started later?

(3) Can poultrymen adjust their housing of chicks and layers for winter raising of pullets without expenditure for special buildings which, in these times of high building costs and declining poultry and egg prices, may seem inadvisable?
(4) How will starting pullets in November affect egg size and rate of lay? Will these be sufficiently different from the usual pattern to minimize or offset the gains?
(5) What will be the effect on fuel, feed, and labor requirements and their consequent effect on costs?

Because these questions are not at present answered, further research must be conducted before the change to November housing of pullets can be recommended for general use. These questions cannot be answered from poultry farm management studies because the number of farms starting pullets in the fall are too few and the practice, where now used, is only in special cases and on usually atypical farms. This means that poultry production departments should conduct experiments to learn what the effects will be. It further means that, if these questions really present problems in the early starting of chicks, experimentation may result in techniques of handling pullets and layers which will overcome the difficulties and enable poultrymen to take more complete advantage of seasonal price differentials.

Two departments, Poultry and Agricultural Economics, have a mutual stake in the results of the experiments. The Department of Agricultural Economics, through its Farm Management studies, outlined a management system and the possible benefits of such to poultrymen. The Poultry Department at Cornell University, recognizing the problems, has initiated experiments to supply the answers and enable poultrymen to adopt the practice. Together the two departments are working on a problem that gives promise of helping commercial poultrymen increase their returns from poultry farming.

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PREDICTING ANNUAL EGG PRODUCTION IN THE UNITED STATES*

THE ability to predict fairly accurately egg production in the U. S. for one or more years in advance is important for outlook and price policy work. Reasonable estimates may be determined through regression analysis.

Feed is the most important direct cost of producing eggs. It usually accounts for 50 to 75 percent of the total costs of producing eggs. It would be expected, therefore, that the relationship between farmers' expectations regarding the cost of feed and the price received for eggs would have a direct bearing on the number of eggs produced in any period. The average rate of lay of hens in the U.S. increased 37 percent from 1925–29 to 1948. This resulted in a decrease in the amount of feed required to produce one dozen eggs. Therefore, some measure other than a direct egg-feed price ratio is needed. Members of the Poultry Branch of the Production and Marketing Administration have used what may be called an "egg value per hen-feed price ratio" to correct partially for the change in rate of lay.[1] It is obtained by multiplying the average number of dozen eggs produced per layer on farms by the average farm price of eggs. This product is then divided by the average cost of one pound of poultry ration. This ratio thus indicates the number of pounds of feed which are equal in value to the average number of eggs produced per layer. Since the numerator in this ratio is the value of eggs produced per hen rather than the farm price of eggs, a better measure of net income results.

Prediction of the Number of Pullets and Potential Layers on Farms, October 1

Simple correlation analysis shows that 84.5 percent of the variation in the number of pullets in U. S. Farms during 1931–32 to 1947–48 was associated with changes in a weighted average[2] egg value per hen-feed price ratio.

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* Journal Paper No. J-1815 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 1029.

Data on hen numbers and egg production are from USDA sources.

[1] C. C. Warren and Humbert Kahle. Personal communication, 1948. They term this ratio, "egg production per hen-feed price ratio."

[2] Weights used for preceding hatching season as follows: November 1, December 2, January 3, February 4, March 5, April 4, May 1. These weights approximate those used by the BAE in predicting number of chickens to be raised on the basis of the egg-feed price ratio.

In this computation:[3]

y = Millions of pullets on U. S. farms, October 1

x = Weighted average egg value per hen-feed price ratio

$y' = 38.44 + 23.19x$

$r^2 = .845$

$r = .919$

Standard deviation from regression = 20.16

On the average, a change of one pound in the weighted average egg value per hen-feed price ratio was associated with a change in the same direction of approximately 23 million pullets on farms on October 1. Over the 16 year period the predicted number of pullets varied from the actual number by 0.2 to 11.7 percent.

The weighted average egg-feed price ratio was of no value in predicting the number of pullets on U. S. farms on October 1 for the 1931 to 1948 period. Only 15 percent of the variation in number of pullets during the period of the study was associated with changes in the price ratio.

In the same period, 82.7 percent of the variance in the number of potential layers on U. S. farms on October 1 was associated with changes in the weighted average egg value per hen-feed price ratio and the simple average of the same ratio for July, August and September just preceding October 1.

In this computation:

y = Million of potential layers October 1

x_1 = Weighted average egg value per hen-feed price ratio

x_2 = Simple average of July, Aug., Sept., egg value per hen-feed price ratio

$y' = 139.54 + 29.37x_1 + 1.65x_2$

$R^2 = .827$

$R = .909$

Standard deviation from regression = 30.07

On the average, the number of potential layers on farms on October 1 changed in the same direction by 29 million with each change of one pound in the weighted ratio and by less than two million with each change of one pound in the July, August, September ratio. The latter factor made no significant contribution. The predicted numbers varied from the actual numbers by 0.4 to 13.4 percent during the period. In 13 of the 16 years the estimated

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[3] The notation "y'" refers to estimated quantity in all computations.

number was within five percent of the actual number reported. The largest error resulted in under-estimation in 1944.

Assuming that there was a relationship between the current year's operations and those of the preceding year, the number of potential layers on farms the preceding October 1 was used as an additional variable to the weighted average egg value per hen-feed price ratio. The results of this computation were:

y = Million of potential layers October 1

x_1 = Weighted average egg value per hen-feed price ratio

x_2 = Million of potential layers preceding October 1

$y' = 35.50 + 18.93x_1 + .493x_2$

$R^2 = .933$

$R = .966$

Standard deviation from regression = 19.07

Thus about 93.3 percent of the variance in the number of potential layers on farms on October 1 was associated with changes in the above two variables. On the average, the number of potential layers on October 1 changed in the same direction by 19 million head with each change of one pound in weighted average egg value per hen-feed price ratio and by a half million head with each change of one million head on farms the preceding October 1. Using these variables, the predicted number varied from the actual number by 0.4 to 7.8 percent during the period covered. In 14 of the 16 years, the actual number varied from the predicted by less than four percent.

Prediction of the Number of Eggs Produced during Succeeding Year

A fair indication of the number of eggs to be produced during October 1947 to September 1948 or during the calendar year 1948, for instance, may be made in June 1947. The weighted average egg value per hen-feed price ratio was correlated with the succeeding crop year (October 1 to September 30) and succeeding calendar year egg production for 1931–32 to 1947–48. Variation in the above ratio explained about 77 percent of the variance for each of the two production periods. For the crop year production estimate we have the following:

y = Billion dozen eggs produced during crop year

x = Weighted average egg value per hen-feed price ratio

$y' = .3406x - .1550$
$r^2 = .766$
$r = .875$
Standard deviation from regression = .3948

Changing y to million dozen eggs produced in the succeeding calendar year, we obtain

$y' = .3438x - .1573$
$r^2 = .767$
$r = .876$
Standard deviation from regression = .3959

It may be seen from the above regression equations that on the average for each change of one pound in the weighted average egg value per hen-feed price ratio, egg production changed in the same direction by approximately 340 million dozen. However, in each of the above comparisons the predicted egg production varied from actual production by about 0.5 to 17.0 percent.

Since there has been a high correlation between October egg production per hen and average production per hen during the succeeding crop year (0.986), the number of potential layers on farms and the October rate of lay were correlated with crop year egg production. The results follow:

y = Billion dozen eggs produced in succeeding crop year
x_1 = Million potential layers, October 1
x_2 = Egg production per hen during October
$y' = .00787x_1 + .2533x_2 - 2.08$
$R^2 = .987$
$R = .993$
Standard deviation from regression = .095

Thus changes in the above two factors were associated with about 98.7 percent in variation in egg production for the period 1931–32 to 1947–48. On the average, the number of eggs produced changed by 7.9 dozen in the same direction with a change of one in the number of potential layers and by 253 million dozen for each change of one egg per hen in the October rate of lay. When egg production was predicted with the above regression equation, the actual number deviated from the estimated number by 0.0 to 4.23 percent. In all but three years of the period, the predicted number was within three percent of the actual number and in 10 years the predicted number was within two percent of the actual number.

Seasonal Decline in Number of Layers

Since egg production can be predicted relatively accurately on basis of numbers of potential layers at the beginning of the laying year and rate of lay in October, it is obvious that there is little adjustment in laying flock numbers during the laying year.

January has been the high month for number of layers on farms and August the low month in each of the last 24 years, except in six years in which December was the high month. The percentage decline in the number of layers on farms from January 1 to August 1 has been relatively constant. The low percentage decline was 21.7 in 1942 while the high was 30.2 in 1946 with a mean decline of 26.1 percent for 1931 to 1948. The January-July egg value per hen-feed price ratio was associated with less than 31 per cent of the variation in the percentage decline in number of layers on farms from January 1 to August 1 when each was based on percent of preceding year. To test further the effect of this price-cost relation on disappearance of layers from U. S. farm flocks, the January egg value per hen-feed price ratio was correlated with the percentage decline in February. The same correlation was computed for April-May. This factor was associated with only 23 percent of the variation in the decline for February and 27 percent for May.

Summary and Conclusions

Returns above feed costs are important in determining the number of flock replacements produced for egg production. The ratio of the value of eggs produced per hen to feed costs is a better measure of these returns than an egg-feed price ratio.

The major portion of the short time adjustments in egg production comes during the chick buying and growing period. Therefore, egg production in the succeeding crop year can be quite accurately predicted on the basis of number of potential layers on October 1 and the rate of lay during October.

It is probable in linear regression analysis as used above that relevant variables have been omitted. The tendency toward a higher degree of specialization may change the structure of egg production. The October number of potential layers and the October rate of lay are affected by factors not used in this analysis. Nevertheless, at present, the above factors are valuable for predicting egg production.

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A TECHNIQUE FOR ANTICIPATING CHANGE IN THE VOLUME OF EGG STORAGE

THE volume of egg storage is an important factor to be considered in evaluating egg price prospects. Eggs start moving into storage with the increase in egg production in early spring and storage volume usually reaches its maximum in August. However, this peak volume varies considerably from year to year. What factors are responsible for these changes in the volume of storage? Can a relationship be found which will enable price analysts to forecast levels of storage with any degree of accuracy? The study here reported attempts to answer these questions.

Factors Associated With Changes in the Volume of U. S. Egg Storage Holdings, August[1]

Three factors were found to be significantly related to changes in the volume of egg storage. The number of hens and pullets on farms January 1 was used as an indicator of the volume of egg production which would be forthcoming. The spread between the April-May-June and October-November-December farm price of eggs the preceding year was used as a measure of into-storage out-of-storage spread—and therefore an indicator of relative storage profits—of the storage operations of the previous season. The third factor was the spread between Chicago future quotation and U. S. farm price of eggs on March 15. This was considered as a measure of the outlook for profitable operations of the current season. These three factors respectively were associated with 53, 27, and 39 percent of the variability of August storage volume.

The two factors, hen and pullet numbers and the into-storage out-of-storage price spreads of the preceding year, were associated with 64 percent of the variability of August storage. When the number of hens and pullets increased 10 percent over the previous year the August storage volume increased 21.1 percent. When the cents per dozen price spread increased 10 percent, the storage volume increased 1.9 percent. Since these data are available soon after the first of the year, estimates which explain almost two thirds of the changes in August storage can be made before the storage season really gets under way.

In April the estimate can be considerably improved. When the spread between the futures quotations and farm price during March

[1] Egg storage holdings in this analysis include both shell and frozen egg stocks.

is available, an estimate can be made which is associated with 73 percent of the variability in August storage levels. Of the three factors, the number of hens and pullets on farmers was the most important (Table I).

TABLE I. RELATIVE IMPORTANCE OF VARIOUS FACTORS IN EXPLAINING CHANGES IN THE VOLUME OF EGG STORAGE ON AUGUST 1, 1925–1942

Factor	Percent of net variation explained by each factor*	Percent increase in storage holdings with a10 percent increase in factor*
Hens and pullets on farms January 1	46	17.6
Cents per dozen spread between April-May-June and October-November-December farm price price of eggs, preceding year	16	1.4
Cents per dozen spread between Chicago future and U. S. farm price on March 15	25	1.3

* After eliminating the effect of the other two factors.

The Usefulness of the Relationship in Forecasting August Egg Storage

From this relationship a regression equation was obtained as follows:

X_1 = Volume of U. S. egg storage on August 1 as a percentage of the preceding August 1

X_2 = Number of hens and pullets on farms January 1 as a percentage of the preceding January 1

X_3 = Cents per dozen spread between April-May-June and October-November-December egg price of the year earlier expressed as a percentage of the preceding year.

X_4 = Cents per dozen spread between Chicago future and U. S. farm price on March 15 expressed as a percentage of the preceding year.

$$X_1 = 1.756X_2 + .129X_3 + .140X_4 - 101.518$$

Table II and Figure 1 show the estimations obtained from this formula compared with the storage volume as it actually was reported. The estimates made in April were an excellent indicator of actual August storage levels in years when changes were relatively moderate. In years in which variations in storage levels were extreme, the estimates were considerably less accurate. This has been particularly true during the postwar years, when the level of storage has fluctuated violently. However, the direction of change has been correctly anticipated for 21 of the 25 years.

TABLE II. CHANGES IN VOLUME OF EGG STORAGE HOLDINGS AS ESTIMATED BY FORMULA AND AS ACTUALLY REPORTED, August 1, 1925–1949

Year	Percent of preceding year	
	Estimated	Actual
1925	114	110
1926	95	101
1927	114	115
1928	108	98
1929	81	90
1930	129	125
1931	87	88
1932	92	72
1933	111	136
1934	96	98
1935	84	91
1936	101	94
1937	124	126
1938	81	76
1939	114	109
1940	104	110
1941	105	99
1942	128	130
1943	129	117
1944	114	110
1945	89	64
1946	98	131
1947	86	65
1948	144	119
1949	86	50

This formula does not take into consideration many of the other factors which evidently influence storage operations during some years. However, with the factors which indicate future supplies,

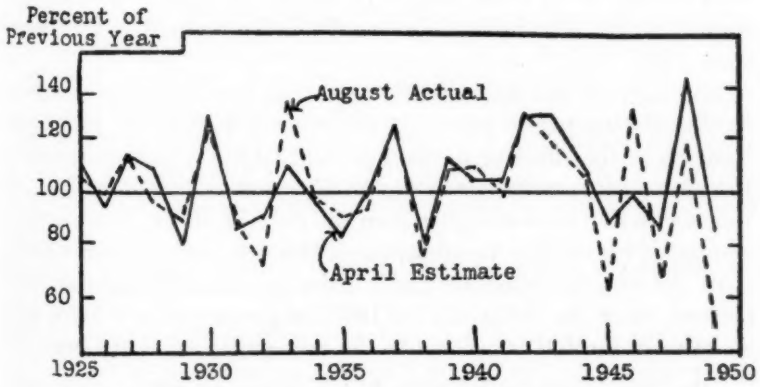

FIG. 1. Estimated Compared with Actual Changes in Storage Stocks of Eggs, August 1, 1925–1949.

past storage profits, and anticipated future storage profits, nearly three fourths of the changes in final storage volume can be predicted well in advance. This relationship when used wisely certainly should be a useful tool. However, the user should be particularly aware of the fact that the formula does not incorporate whatever influence government support operations may have on the storage operation.

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THE POLITICS OF "BASIC" CROPS IN FARM LEGISLATION

FARM legislation during the past 17 years has consistently favored the "basic" crops,[1] except that during World War II benefits were extended to nonbasic crops to induce increased production. In most instances war-time price guarantees were neither costly nor troublesome to the government. Most prices were above the guaranteed level as a result of increased demand. Now that the exigencies and the commitments of the last war are over, price supports for nonbasic commodities are withdrawn or weakened.

Title I of the Agricultural Act of 1949 provides that during 1950 price supports for basic crops shall be at 90 percent of the parity price—unless growers disapprove marketing quotas. Titles II and III designate the following price supports for nonbasic agricultural commodities for 1950: wool, tung nuts, honey, and Irish potatoes—60 to 90 percent of parity; whole milk, butterfat and their products—75 to 90 percent of parity; all others—0 to 90 percent of parity. The basic crops are still being favored as they were since 1933.

The Agricultural Acts of 1948 and 1949 decreed a new method for calculating parity prices, in effect since January 1, 1950. For basic crops the effective parity price until 1954 is either the old or the new parity, *whichever is higher*. For nonbasic commodities, if the new parity price is higher than the old, the effective one is that computed by the new formula; but if the new parity price is lower than the old, the effective parity price is a transitional one, five percent below the old parity for 1950, 10 per cent less in 1951, and so on until the full transition to the new parity level has been ac-

[1] The "basic" crops favored under AAA legislation are cotton, wheat, corn, tobacco, rice, and peanuts. Peanuts were added to the list in 1941.

complished. This procedure again indicates that basic crops receive the more favorable consideration. For instance, on January 15, 1950, the old parity price for eggs was 51.8 cents per dozen; the new parity price was 45.1 cents. If eggs had been designated a basic crop, the parity price would have remained at 51.8 cents. Since it is nonbasic, the effective parity price is five percent less than the old one, or 49.2 cents. If the discrepancy between the old and the new parity prices continues, the effective price will be lowered five percent each year until the new parity level has been reached.[2]

Why are certain crops favored in farm legislation? We shall test the hypothesis that a Congressman's vote was influenced by the crops grown in his district, and that legislators from those areas where basic crops are important have acted in unison to get favorable legislation for their constituents, defeating attempts to extend benefits to other farm groups. It is interesting to note that during the debate on the Agricultural Act of 1948, Representative Gearhart of California offered an amendment to support prices of citrus and dried fruits and raisins "at such percentage of parity as shall be determined by the Secretary." Representative Hand of New Jersey offered an amendment to include vegetables and fruits. Both amendments were defeated.[3]

In examining the relationship between a Congressman's vote on farm legislation and what his farmer constituents grew, we can use the Agricultural Adjustment Act of 1938 as a case study.[4] The first step in this analysis was to calculate the value of the total crops harvested for each state in 1939 and the percentage of total value which consisted of basic crops.[5] We find that in 11 states the value

[2] See U.S.D.A., B.A.E., *Agricultural Prices*, January 31, 1950, pp. 3, 52.

[3] *Congressional Record*, Vol. 94, No. 107, pp. 8188–8191 (June 12, 1948).

[4] The Agricultural Adjustment Act of 1933 was rushed through in the feverish early days of the New Deal; it was experimental and it contained the Thomas Inflation Amendment. The vote on it would therefore be influenced by too many extraneous factors. The Agricultural Acts of 1948 and 1949 were passed without record votes in the House, and therefore we cannot determine the relationship between how a Congressman voted and to what extent his constituents were favored by the Acts.

[5] The following section is based on United States Department of Commerce, Bureau of the Census, *16th Census of the United States: 1940, Agriculture*, Government Printing Office, Washington, 1942; 75th Congress, 3d Session, *Congressional Directory*, 1937; *Congressional Record*, Vol. 83, Part 2, p. 1727 (February 13, 1938); *ibid.*, p. 1881 (February 14, 1938).

Basic crops in 1938 and 1939 were corn, wheat, cotton, tobacco and rice. The farm value of rice is computed at the average price of 72.8 cents per bushel, taken from *Agricultural Statistics, 1947*, p. 29. The vote on the 1938 Act is being compared with crops grown in 1939; this is unavoidable because there are no adequate production figures by counties for 1937 or 1938.

of basic crops made up less than 12 percent of the total crops harvested; 17 Senators from these 11 states opposed the Agricultural Adjustment Act of 1938, and five Senators favored the Act.[6] In 17 states basic crops accounted for more than 55 percent of total crops harvested; 33 Senators from these states favored the Act, and only one opposed.

We can separate those states in which basic crops made up less than 50 percent of total crops harvested from those where basic crops were more than 50 percent of the total. There were 28 states in the former group; 30 Senators (15 Democrats, 12 Republicans, three Independents) from these states opposed the farm bill; 24 Senators (all Democrats) supported the bill.

Among the 20 states in which basic crops made up more than 50 percent of total crops harvested, 35 Senators (32 Democrats, two Republicans, one Independent) supported the bill; five were opposed (four Democrats, one Republican).

In other words, in those 28 states where basic crops did not comprise 50 percent of total crops harvested, their Senators opposed the Agricultural Adjustment Act of 1938 by a ratio of five opposed to four in favor. Even 38 percent of the Democratic Senators from these states placed themselves in the opposition. But in those 20 states where basic crops made up more than 50 percent of total crops harvested, their Senators favored the Act by a seven to one ratio; even the Republicans from these states favored it by two votes to one.

Table I summarizes the Senate vote on the Agricultural Adjustment Act of 1938.

It is of course conceivable that other variables are highly correlated with the senatorial voting pattern. By separating the states with a high ratio of values of basic crops to all crops produced we tend at the same time to separate rural from urban states. A Senator could have a variety of motives and influences determining his vote. We would have to study the man, his background, his associations, his psychological pattern, his aspirations, his profession, his political alliances, and many other factors to explain fully his vote. Although the crops grown by his constituents are but one of many determinants, it apparently is an important one.

[6] Opposition or support is based not only on the recorded vote, but those Congressmen who did not vote are counted if they were paired for or against, or if an announcement was made in Congress on how they would have voted if they were present.

Congressional districts were classified according to whether basic crops made up more or less than 50 percent of the total value of crops harvested in the district.[7] We find that wherever basic crops made up half or more of the total, 113 Congressmen (102 Democrats, 11 Republicans) favored the 1938 Act; 25 (18 Democrats, 7

TABLE I. SENATE VOTE ON THE AGRICULTURAL ADJUSTMENT ACT OF 1938

	28 states in which value of basic crops comprised *less* than half of total crops harvested	20 states in which value of basic crops comprised *more* than half of total crops harvested
For the Act:		
Democrats	24	32
Republicans	0	2
Independents	0	1
Total	24	35
Against the Act:		
Democrats	15	4
Republicans	12	1
Independents	3	0
Total	30	5

Source: See footnote 5.

Republicans) were opposed. That is, Representatives from these districts divided 4½ to 1 in favor of the Act. It is especially significant that almost two thirds of the Republicans from these districts supported it.

In districts where basic crops made up less than half of total crops harvested, or where no crops were harvested, 154 Congressmen (145 Democrats, three Republicans, six Independents) favored the Act; 113 (38 Democrats, 68 Republicans, seven Independents) were opposed. We see here a surprisingly large measure of support for the Act from districts which did not grow the basic crops to any great degree. This phenomenon can be explained in part by the fact that urban congressional districts are included in this category. It is a matter of indifference to a Congressman from a city whether one or another crop is favored. His attitude might well be, the fewer the crops which receive government benefits, the

[7] Congressmen-at-large were classified according to whether basic crops in their states as a whole made up more or less than half the total.

better. Possibly urban political organizations are stronger than their rural counterparts, and they can more readily insist successfully on a vote along party lines. Finally, to the extent that Congressmen from urban constituencies favor the tax-payer rather than the consumer, they could vote for the Agricultural Adjustment Act of 1938 because the provisions in the Act for price supports and output restriction imposed the greatest burden on consumers. With a relatively inelastic demand for farm products, small reductions in output caused more than proportionate increases in prices. If a given increase in income is desired for farmers, it is cheaper to the government to curtail output and raise prices than it would be, say, to provide large scale cash subsidies.

To separate urban from rural districts, a congressional district was considered to be urban if it is no larger than a county. Using this procedure, 108 urban Congressmen were subtracted from the total, leaving a record of rural districts. Among the rural districts with basic crops making up more than half the total crops, 110 Congressmen (99 Democrats, 11 Republicans) supported the Act, and 24 opposed (17 Democrats, seven Republicans). Rural districts with less than half the crops basic showed 80 Congressmen (74 Democrats, two Republicans, four Independents) supporting the Act, and 83 opposed (22 Democrats, 54 Republicans, seven Independents). That is, in rural districts where basic crops were important, almost two thirds of the Republicans and 85 percent of the Democrats favored the Act. But where basic crops were not as important, 96 percent of the Republicans and 23 percent of the Democrats opposed the Act.

Table II summarizes the vote in the House of Representatives on the Agricultural Adjustment Act of 1938.

Basic commodities as defined in farm legislation are produced mainly in the Midwest and South. Apparently Congressmen from these areas have combined with those from urban districts to push through legislation favorable to the growers of basic crops. Congressional log-rolling determines which growers shall be helped and which shall suffer neglect. Since crop restriction and price supports are applied only to certain crops, farmers can utilize all their resources by diverting part of their acreage to those crops which do not have the benevolent attention of Congress, and the production of which is therefore unrestricted. The consequence may be further misallocation of resources.

It cannot be said that growers of basic crops needed special consideration because they faced sharper price declines in the Great Depression. Between 1929 and 1932 average prices received by farmers for basic crops declined less than prices for many other crops. Prices for basic crops during this three-year period fell between 42.6 percent (tobacco) and 63.1 percent (wheat). But prices

TABLE II. HOUSE OF REPRESENTATIVES VOTE ON THE AGRICULTURAL ADJUSTMENT ACT OF 1938

	All districts		Rural districts*	
	Basic crops comprise *less* than half of total crops harvested	Basic crops comprise *more* than half of total crops harvested	Basic crops comprise *less* than half of total crops harvested	Basic crops comprise *more* than half of total crops harvested
For the Act:				
Democrats	145	102	74	99
Republicans	3	11	2	11
Independents	6	0	4	0
Total	154	113	80	110
Against the act:				
Democrats	38	18	22	17
Republicans	68	7	54	7
Independents	7	0	7	0
Total	113	25	83	24

* Rural districts are defined as congressional districts which are larger than a county.

Source: See footnote 5.

of the following nonbasic crops declined between 65.6 and 82.0 percent: almonds, apricots, avocados, dry edible beans, broomcorn, cherries, citrus fruit, cowpeas, dates, figs, flaxseed, pears, plums, potatoes, rye, soybeans, and wool. (The list is not exhaustive.) In the case of tobacco, not only was its price decline between 1929 and 1932 smaller than the price drop for the crops listed above, but tobacco prices fell less than those for poultry and eggs, dairy and meat products.[8] Yet tobacco was favored over nonbasic crops.

Nor can it be said that the basic crops are of greater value than

[8] Computed from *Agricultural Statistics, 1948*, passim. Some fruits and dairy products listed above were aided by the Marketing Agreement and Order Program, but they were not singled out for consistently favored treatment in congressional legislation, as was true of the basic crops.

the others. During 1929–32 cash receipts from all farming and value of home consumption totaled almost 37 billion dollars. But the farm value of the six basic crops produced in those four years aggregated less than 11 billion dollars, or 29.4 percent of the total.[9] Since a considerable portion of the basic crops is fed directly to livestock, the *sales* of basic crops made up less than one fourth of total farm output.

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[9] Computed from *ibid.*, pp. 7, 34, 43, 79, 122, 143, 590.

BOOK REVIEWS

The Social and Economic Significance of Land Tenure in the Southwestern States, A Report of the Regional Land Tenure Research Project, Edited by Harold Hoffsommer, Chapel Hill: The University of North Carolina Press, 1950. Pp. xv, 666. $6.00.

The publication of this book promises to be a landmark in tenure research. Probably no more comprehensive or definitive work on land tenure is in existence.

The Regional Land Tenure Research Project was begun in 1942 and is a cooperative undertaking of the Bureau of Agricultural Economics and the Agricultural Colleges of Arkansas, Louisiana, Mississippi, Oklahoma, and Texas. The purpose of the study is "to determine and measure the relationships between the tenure status of the farm family and its economic and social performance." The present report presents few policy recommendations, which are to be the subject of a later report, but rather is largely limited to presentation and discussion of the statistical relationships found. The main questions which the study tries to answer may be divided into three groups: (1) What differences in the social and economic performance of farm families are incident to their tenure status? (2) What are the chief factors conditioning the particular tenure status of a farm family? (3) What are the underlying factors which influence tenure status and how are they related to individual farm families? Included in the scope of the study are the fields of farm management, land economics, and rural sociology, and also law and government insofar as they affect land tenure.

The procedure used was that of developing a comprehensive schedule covering a wide variety of items in the above fields and sampling farmers in four subregions of the region: (1) Western Coastal Plain in Arkansas and Louisiana; (2) Eastern Coastal Plain in Mississippi; (3) Rolling Plains in Oklahoma; and (4) Blackland Prairie in Texas. A total of 1,841 usable schedules were returned from the 15 counties and parishes sampled in whole or in part in these subregions.

In establishing tenure relationships, conventional tenure groups were used with a large variety of sorts and cross tabulations and with some multiple correlation analysis. By using these techniques, the effect of tenure factors on family performance was more or less

isolated and certain tenure relationships established or not established. This procedure can be regarded either as an effort to verify hypotheses concerning the effects of tenure on farm family performance or as a nontheoretical search for statistical relationships.

Turning now briefly to the findings of the study, the major impression this reviewer has is that there are many factors besides tenure that are related to farm family performance. The study, of course, confirms the popular belief that lower incomes and socio-economic status are associated with lower tenure status, but much of this association is "explained" by relationships with other factors. While owners and part-owners in the sample had higher farm incomes than renters, most of the difference was accounted for by the fact that owner farms were larger. Land use and crop organization showed little variation by tenure. Capital investment, use of equipment, and mechanization were related primarily to size of farm and not to tenure. No definite tenure relationships were established in regard to use of labor and labor efficiency. Owner-operators had more livestock than renters, however, even after allowance for size of farm. Gross income of cropper tracts compared favorably with those of complete farms of the same size. Three measures of farm size—capital invested in the farm business, productive man-work units required, and acres of cropland—accounted for 64 to 76 percent of the variation in gross farm income.

The socio-economic status of farm families was measured by an index which considered such things as housing, movable possessions and social participation. Here it was found that socio-economic status was related to net family income, scale of operation, and tenure. But for any given scale of operation, status tended to be higher for owners and part owners than for renters, and the latter usually ranked higher than croppers. There was a wide status spread in each group, indicating that tenure alone is not responsible for the status of a farm family.

The question of how tenure affects the efficient use of agricultural resources was attacked by correlating gross farm incomes in the sample with capital invested in the farm business, productive man-work units of labor required, and acres of cropland. For any farm, attained gross farm income expressed as a percent of the "expected" farm income (computed from the regression equation embodying the above three size factors) is a measure of "quality" of the farm business. The "quality of business" can be considered a

measure of how efficiently resources are used for any given scale of operation.

On the whole full and part owners made a rather poor showing in regard to gross quality of business, and croppers showed a higher gross quality than other tenure groups. On the basis of this measure owner-operation does not seem to be related to a more efficient use of agricultural resources, or perhaps it would be more correct to say that owner-operation does not seem to be related positively to managerial success as reflected by this quality measure. At this point the policy proposal is made that, as long as an operator, regardless of tenure, continuously obtains average or above average quality of business, he has a suitable size of farm from the standpoint of the public interest. The interesting policy and statistical question of how those who are below average are to be brought up to the average is not discussed.

In regard to soil conservation, it is pointed out that owner-operation is associated with a more conserving, diversified, livestock type of farming. Owner-operators also participated more in soil conservation programs, although here it must be remembered that such projects assume that conservation is the responsibility of the landowner.

The report thoroughly analyzes several factors which give rise to differences in tenure status. One of the most important of these is age. In each area sampled ownership increased directly with age and reached a maximum at about 35 years of earning life. It was concluded that, with a given amount of credit and capital, a farmer often has a choice of higher tenure status on less productive land or lower tenure status on more fertile soil. Generally, the picture shows that a farmer accumulates capital in a lower tenure status on productive land, and, as he progresses up the tenure ladder, he moves to less productive land.

Several other factors important to an analysis of tenure are discussed in this book but cannot be commented upon in this short review. Among these are leasing arrangements, use and sources of capital, federal programs and tenure, community and institutional factors, and a long chapter on legal aspects of tenure and farm credit. The book is well edited and contains an excellent index. Four appendixes define the terms used, explain the research procedures, present 135 pages of statistical tables, and list other tenure studies in the southwestern region.

The greatest usefulness of this report will probably be as a tool for research workers and teachers and as a basis for policy formulation. Since policy formulation is based, at least in part, on public opinion, it is perhaps unfortunate that the book is relatively technical and will probably have little popular appeal. Yet comprehensive statistical analyses of this type are needed for an informed public opinion. It would seem that there is a real need for a condensed, popularized, and nontechnical version of this report of, say, 75 to 100 pages.

RUSSELL W. BIERMAN

Federal Reserve Bank of Richmond

Elements of Agricultural Economics, G. W. Forster and Marc C. Leager. New York: Prentice-Hall, Inc., 1950. Pp. xvi+441.

This book, multigraphed in 1947 under the title *Elements of Farm Economics*, is designed as a textbook for an elementary course in Agricultural Economics. It is written in five general parts: Introduction, Production Economics, Marketing of Farm Products, Agricultural Finance and Insurance, and Policies and Programs. Under each of these major parts the authors deal with several subtopics, in most cases quite distinct from each other. As an example of the breadth of coverage, titles of the four chapters in the 60-page introduction may be cited. They are: "The Nature of Agricultural Economics," "The Scope of Agricultural Economics," "Our Economic System," and "Elementary Price Concepts." The part devoted to Production Economics is similarly wide in scope, ranging from discussion of the various aspects of farm management, organization, and record keeping to the "economics of conservation" and the "economics of land tenure." The inclusion of this last subject under Production Economics strikes the reviewer as being somewhat strange, considering that the system of values into which the various forms of land tenure are rooted is much broader than that of economic efficiency. The parts on Marketing and Finance are somewhat more single-purposed, while the section on Policies and Programs deals with tariffs, farmer organizations, and farm policies—including the "Brannan Plan."

In reviewing a text such as this, one cannot help thinking about the use to which it might be put—about the nature of the course which might emerge were it used as a text. (That is the reason for the above rather detailed summary of the book's contents.) As I

see it, a beginning course in Agricultural Economics might attempt one of three things: (1) to develop the fundamental concepts preliminary to analysis of economic problems of agriculture in subsequest courses; (2) to conduct a survey of the various phases of Agricultural Economics, with a discussion of some of the central problems in each phase; or (3) to attempt really to analyze one's way through one, two or possibly three major economic problems confronting agriculture, developing the theoretical concepts necessary to make intelligent attacks upon these problems. Clearly the book is set up with the second approach in mind. In this reviewer's judgment, it would serve quite well in this approach. The book would be fairly adequate in the third approach if amply supplemented with outside reading, depending somewhat upon the particular problems chosen, but would serve very poorly if the first objective were chosen.

Probably very few agricultural colleges have curricula of such a type as lend themselves to approach number (1). This is probably as it should be. We need more emphasis upon the development of theoretical concepts out of the actual conduct of problem-solving activities, and less reliance, perhaps, upon the application of hand-me-down tools which have been built without reference to the particular problems in our fields. If approach (3) is used, any text now available, including the one under review, would find its principal use as a reference book rather than as a text.

The emphasis in this book upon proposed solutions to important existing economic problems of agriculture should commend it well for reference use in this manner. Its chief limitations lie in the extreme brevity, and consequent arbitrariness in some instances, imposed by its general inclusiveness. Its weakest sections are "Elementary Price Concepts," and "Our Economic System." Discussion of these sections is probably too elementary and brief to serve any very useful purpose, and the subject matter too complicated for the average student to grasp in any meaningful way with such a brief exposure. The elementary price concepts are not as well integrated into subsequent sections as might be wished. The discussion of marginal utility in this section (p. 50) suffers from the hoary ice-cream cone (here dishes) complex which confuses the real issue of the simultaneous effect upon utility creating capacities of all the units in the total function, with the spurious problem of the changing desire for the good due to the adding of successive units. This

confusion leads us back into all the Marshallian consumer-surplus problems which we had hoped to have weeded from our thinking.

Another minor, but important, criticism might be made of the text's discussion of the "Characteristics of farming" (*vis-à-vis* non-farm industries). The authors discuss the implications of the fact that in farming "the home and farm business are integrated," also that "the functions of management and ownership are combined." Except for a casual listing of family labor as a "fixed cost," they miss, however, the more important point, that the labor factor is to a very large extent embodied in the same persons as is management. Failing to recognize this fact, farmers often find themselves arguing against their own best interests, treating labor as a cost (to be minimized by any means possible) rather than as the most important income producing factor which they own.

The strongest section of the book is that dealing with farm organization and management. Its generally excellent organization will be appreciated by the teacher. The book bears throughout the firm imprint of the senior author's long experience and deep and subtle insight into the economic problems of agriculture. One wishes, however, that it had retained a bit more of his humor.

ERVEN J. LONG

University of Tennessee

An Economic Analysis of the Tax Status of Farmer Cooperatives, John H. Davis, Washington, D. C.: American Institute of Cooperation. Pp. viii, 124.

This book should do much to clarify a subject regarding which much misunderstanding exists. The chief strength of the book lies in the fact that in 124 pages it covers the subject reasonably completely, on the whole accurately and in readily understandable language. For these reasons the book commends itself to the general reader and to members and officials of cooperatives. It should also prove useful as reference material for undergraduate college courses in cooperation.

The general plan of the book is as follows: Chapters 1 and 2 are introductory and provide background information regarding the place and importance of farmer cooperatives, their legal structure, methods of operation, and ways of making settlements with patrons. Among the distinctive features of cooperatives discussed, the patronage refund receives major emphasis. Some of this material is

discussed only in summary form. The main body of the book (Chapters 3 to 6, inclusive) is devoted primarily to an exposition of the income tax status of cooperatives and their patrons (with special emphasis on patronage refunds), and the tax status of cooperatives in Great Britain, Canada, and the Union of South Africa. The final chapter consists of a summary and conclusions.

Although the author is a friend of cooperatives and has expressed little criticism of them, objective economic and legal students of cooperation will probably find themselves in substantial agreement with his approach to the problem and with his major conclusions, the more important of which are:

1. A cooperative is a form of business organization. It is consistent with and is an integral part of the American system of free, competitive, private enterprise.

2. Dr. Davis properly distinguishes ". . . between monies which are excludable when computing taxable income and those which are exempt from taxation." That is, the exclusion of patronage refunds from corporate income involves neither a statutory exemption nor administrative discretion. It is based on a definition of income established by the courts and applies alike to all taxpayers.

3. Farmer cooperatives that have availed themselves of the option granted them by the Federal Internal Revenue Code to apply and qualify for exemption from the payment of federal income taxes may enjoy certain limited tax privileges. However, these are much less than is generally supposed.

4. Neither exempt nor non-exempt cooperatives enjoy a significant competitive advantage over non-cooperative corporations which may properly be attributed to discriminatory tax treatment.

5. Probably a majority of economists would also agree that the so-called "double taxation" of corporate incomes distributed as dividends is inequitable, but that this wrong would not be made right by imposing double taxation on the patronage distributions of cooperatives.

The economic analysis as it relates to cooperatives at a number of points falls short of this reviewer's expectations. In the absence of an adequate concept of the economic nature of a cooperative as a form of business organization, it is difficult to discuss adequately the economic nature and incidence of risks and uncertainty in a cooperative, whether or not risks and losses are borne in a manner that is consistent with the economic purpose of the participants in

a cooperative, the economic significance of the "service at cost" idea, the economic nature of the capital of a cooperative and of the returns paid on it, and other relevant economic aspects of cooperation.

Dr. Davis in Chapter 7 discusses a number of suggestions for changes in the tax laws or practice as they relate to cooperatives. In his conclusions, the only change that he specifically urges is the elimination of the double taxation of corporate incomes. In view of the fact that there is little prospect of this change being made, one may wonder whether he considers no other changes desirable.

Although he finds it ". . . difficult to present any strictly economic justification for the exemption of farmer cooperatives . . ." (p. 102), Dr. Davis concludes: ". . . neither exempt nor non-exempt farmer cooperatives have any great competitive advantage over other forms of business by virtue of preferential tax treatment" (p. 123). The reviewer agrees with this conclusion. Dr. Davis advances several reasons why taxing patronage refunds as corporate income would be impractical, inequitable, discriminatory, and ineffectual (pp. 104–108 and 110–111). Some may question whether the analysis upon which it is based is sufficiently conclusive. In any case, one may wonder what the author would say about the fact that whereas a cooperative with $100,000 of patronage refunds distributed to patrons in the form of capital and reserve equities, would have the whole amount available as capital, a non-cooperative corporation with profits equal to the same amount would have only $62,000 available to it for capital purposes after having paid the Federal income tax thereon.

The publication of this book is fully justified on the basis of the general information it contains. It should also serve a useful purpose in stimulating interesting discussions and further research regarding many aspects of the problem.

FRANK ROBOTKA

Iowa State College

Puerto Rico's Economic Future, Harvey S. Perloff, Chicago: University of Chicago Press, 1950. Pp. xviii, 435. $4.75.

The economic problems of Puerto Rico have been treated many times in popular and scientific articles, as well as in innumerable books. Dr. Perloff, however, has succeeded in combining some of the significant data previously published with additional information gathered in the course of his study to present an excellent, well-

documented volume on Puerto Rico's economic future. Social scientists interested in the present international Technical Assistance (Point IV) Program will find it useful reading.

The book is divided into four parts: (I) Introduction: Historical Background, (II) Puerto Rican Economy: Characteristics and Trends, (III) Population: Individual and Social Development, and (IV) Principles and Programs of Planned Economic Development.

The historical background brings out two salient facts (1) the drastic change in Puerto Rico's economy as a result of the transfer from Spanish to American rule and (2) the failure of American and Puerto Rican authorities to stimulate a balanced economic and social evolution in the island. The basic error of concentrating on programs leading to lower mortality rates, while nothing was done to encourage reductions in birth rates was clearly brought out. It has led to the "dilemma, shared with a large percentage of the peoples of the world, of showing the tendency for economic gains to be swallowed up by the continuing rapid growth of the population. Thus, in the race between economic progress and population growth, the island finds itself in an Alice in Wonderland situation, where one has to run very fast merely to stay in the same place."

The Puerto Rican economy is described in Part II as a "halfway" economy. "It is neither wholly 'backward-colonial' or traditional 'village'; nor is it an advanced high productivity economy." Lack of natural resources, the large and rapidly increasing labor force, and close commercial ties with the United States have led to an economy dominated by agriculture, and based on sugar. Agriculture, however, has been losing ground (relatively) to the manufacturing and handicraft, trade and transport, and service industries. The importance of the present intensive, well-conceived plan for industrial development is magnified by the failure of agriculture to maintain its rate of growth. Federal contributions, especially during the last decade, appear as a significant factor in the Puerto Rican economic development of the last few years. As a major share of these contributions arose during the war, Dr. Perloff concludes that "unless Puerto Rico . . . increases greatly and immediately its stock of income-earning assets, it can expect with time to return to a situation where little or no internal savings would be available for new capital formation and where the island would be almost completely dependent upon investments made by outsiders."

Part III is devoted to a thorough study of what seems to me the

basic Puerto Rican problem—population increase. Dr. Perloff surveys the problems of population control and suggests extending the educational program, undertaking a broad public educational campaign, establishing experimental studies to test the relative effectiveness and acceptability of alternative methods of birth control and initiation of other programs leading to the reduction of birth rates.

Part IV deals with the principles and programs of planned economic development. Dr. Perloff devotes this part primarily to the projection of agriculture, industry, purchasing power and investment, and public services in a way which might lead more effectively to the economic and social improvement of the hypothetical 1960 Puerto Rico with 2,760,000 inhabitants. He makes use of "hypothetical models," which he regards as "neither an attempt at forecasting nor an attempt to establish a specific set of goals." I find Dr. Perloff's projection for 1960 agricultural production and land-use somewhat arbitrary. I have a feeling that limitations placed by soils, topography, farm organization and other physical and social factors have not been taken fully into account in making this projection.

The hypothetical model for industrial production assigns to manufacturing, handicraft, and service industries the estimated increase in the labor force from 1948 to 1960. The estimate of capital requirements for this expansion indicates "that strenuous efforts will be called for to bring about a capital investment in Puerto Rico sufficiently large to provide adequate employment opportunities for the rapidly growing labor force."

The present pattern of government services is found to favor programs "for the direct relief of distress" against those for "resource development and economic improvement." Dr. Perloff suggests that both the Federal and Insular Governments should emphasize "extensive agricultural and industrial development and population-control programs, even at the expense of the ameliorative services."

The book represents a significant contribution to the understanding of Puerto Rican problems. The agricultural phases do not seem to be as well documented and thoroughly treated as the other phases. The study presents effectively the fundamental problems and the basic solutions. It gives a good idea of what may be needed in many other similarly underdeveloped areas of the world.

JULIO O. MORALES

Inter-American Institute of Agricultural Sciences, Costa Rica

The Structure of American Industry. Some Case Studies, Edited by Walter Adams, New York: The Macmillan Company, 1950. Pp. x, 588. $4.75.

This is a collection of 13 essays each by a different author and each treating a single broad industrial grouping, a summary essay on public policy and an epilogue on organized labor. The stated objective is to present through the case-study method a "representative, comprehensive, and up-to-date view of American industry—its diverse forms of market structure and multifarious types of market behavior." The same basic outline is used in each chapter: history and institutional status; market structure and price policy; and public policy alternatives and recommendations. All authors favor the major attributes of free enterprise economic organization and its social and political consequences. The public policy chapter is included in recognition of the increasing importance of governmental intervention affecting entrepreneurial decisions. The labor essay is intended to indicate the reasons for excepting labor from the general policy of maintaining atomistic competition.

The 15 studies present an adequate cross section of major forms of market organization and price policy, although important fields are necessarily omitted. The difficulties associated with authorship by so many persons are obvious but are not the most important weaknesses of this book. In some essays, descriptive data are too forcefully compressed into inappropriate market-classification models. There is no set of generalizations with respect to causes of consistent deviations from pure competition; differences in price policy among the groupings; relative effectiveness of various policies in terms of industry goals or public policy norms; the consistency of accepted norms or government policies; the degree to which alternative norms may be achieved in the present institutional, legal, and governmental setting; and the costs to various groups of changing either the norms or the setting in which they are sought.

Fairly uniform organization of the essays has been followed within the limitations imposed by differences in subject matter, emphasis, technique, or competence. The introductory sections deal with delineation of the industry and its components: scope, importance, major problems, historical development, financial structure, technology, kind and degree of integration, labor organization, and status and functions of the state. Important changes are noted in

technology or factor prices, demand, location, industry organization, and competition from other materials, processes or areas. The market structure and price-policy sections first classify the industry in terms of the kind and degree of competition prevailing in production, procurement, or merchandising; pricing, production, and distribution behavior; methods of control, including output limitation or regulation, product variations, price discrimination, demand manipulation or other nonprice competition and limitations on entry; compulsion towards control from cost structure, resource immobility, capacity, shifts in demand; legal and other institutional determinants of price policy; kinds of competition and cooperation; and major changes in any of these factors. The final section appraises alternative procedures to bring industry behavior into closer conformity with various norms. These include establishment of atomistic competition; changes in governmental functions, norms, or laws; proscription of specific practices and organization. The public policy essay does not summarize the experience described or the generalizations which may be adduced from the other chapters. A challenge to free enterprise from business is held to originate with large and small scale firms alike. A challenge from government is attributed to pressure blocs, rescue legislation, planning, foreign trade control, and above all to fear of political or military upheaval. It is held that free market decisions should govern economic activity, except for prevention of methods generally agreed to be undesirable, and for providing minimum security and regulating industries for which pure competition is impossible. The labor essay indicates that the labor market cannot effectively be appraised in terms of price analysis.

The general compulsion by businessmen towards price control, either through nominally illegal devices or with full assistance of government, is not analyzed. The degree to which profit may in fact be enhanced by these techniques is not appraised. Neither the methods nor the apparent results of control in the various industries are related to differences among them. There is no summary discussion of the effects of all or any of these price policies upon the general economy. The limitations upon the profitability and stability of control devices are not developed. For these reasons, the usefulness of these essays to professional economists is limited. Many of them should provide suitable collateral reading for undergraduate instruction.

GEORGE L. MEHREN

University of California, Berkeley

Urban Mortgage Lending by Life Insurance Companies, R. J. Saulnier, New York; National Bureau of Economic Research, 1950. Pp. xxi, 180. $2.50.

This is one of a number of related investigations that the National Bureau of Economic Research is sponsoring in the field of urban real estate finance. The findings reported deal primarily with the activities of life insurance companies in the non-farm real estate mortgage field and are based on general sources, special tabulations, and questionnaire data supplied by the insurance companies, and a one percent sample of all urban mortgage loans made by them from 1920 through 1946.

The book is divided into six chapters. In these chapters, the author discusses (1) the role of the insurance company as an investor in the urban mortgage market, (2) the legal framework for life insurance company lending, (3) how various companies are organized and how they conduct their mortgage lending activities, (4) the urban mortgage market, (5) lending costs and returns on insurance company loans in 1945, 1946, and 1947, and (6) urban mortgage loan experience in the 1920–46 period.

In 1948, life insurance companies accounted for only 18.6 percent of the $57.8 billion of mortgage debt in the Nation. By classes, this broke down to 14.8 percent of the $33.4 billion in mortgage loans on one–four family dwellings, 25.2 percent of the $19.3 billion in multifamily residential and commercial mortgage loans, and 19.2 percent of the $5.1 billion in farm mortgage debt. Professor Saulnier's analysis of the loan experience of life insurance companies shows that losses from urban mortgage foreclosures during the 1920–46 period averaged slightly more than 10 percent of the amount loaned. The greatest losses were experienced during the depression years on the larger loans made on one to four family dwellings and on loans with low loan-to-value ratios.

This is a worth while piece of research. Its chief weakness lies in the fact that the author makes little or no attempt to use the findings he reports as a basis for policy recommendations.

RALEIGH BARLOWE

Bureau of Agricultural Economics
and *Michigan State College*

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Johnson, D. Gale, "Trade and Agriculture," New York: John Wiley & Sons, 1950. Pp. vii, 198. $2.50.

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Natarajan, B., "An Essay on National Income and Expenditure in India," Madras: Superintendent, Government Press, 1949. Pp. xiv, 102. Rs 3/-.

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*Saulnier, R. J., "Urban Mortgage Lending by Life Insurance Companies," New York: National Bureau of Economic Research, 1950. Pp. xxi, 180. $2.50.

Thompson, Victor A., "The Regulatory Process in OPA Rationing," New York: King's Crown Press, 1950. Pp. xi, 466. $5.75.

* Reviewed in this issue.

NEWS NOTES

The Associated University Bureaus of Business and Economic Research have chosen the following officers for 1951: President, John H. Cover, University of Maryland; Secretary-Treasurer, Henry B. Moore, University of Colorado.

George H. Aull, Head of the Department of Agricultural Economics and Rural Sociology at Clemson College, was made President Elect of the American Farm Economics Association at its meeting in Montreat. He will automatically become President after the 1951 meeting.

Burl Back of the University of Kentucky is on leave to do graduate work at Iowa State College.

Ralph L. Baker has resigned from Iowa State College to accept the position of Associate Professor of Marketing at the Pennsylvania State College, where he will teach and do research in the field of Poultry and Egg Marketing.

Raymond R. Beneke was promoted to an associate professorship in Production Economics at Iowa State College.

C. E. Bishop, formerly of the University of Kentucky, has accepted an appointment as assistant professor at North Carolina State College. For the past two years Professor Bishop has been doing graduate work at the University of Chicago.

John Blackmore has returned from Harvard University to the Tennessee Valley Authority to take charge of the new Economic Analysis Unit, organized in the Division of Agricultural Relations.

Owen Brough, formerly of Iowa State College, has accepted a position as Associate Professor of Agricultural Economics at Washington State College.

D. D. Brown, formerly of the University of Missouri, has accepted a position as Associate Professor of Farm Management at North Carolina State College. He is completing his doctorate at Harvard University.

Dean Emeritus L. E. Call of Kansas State College has returned from a year's leave spent at Silliman University, Philippine Islands, where he directed the development of an agricultural education program.

Emery N. Castle has been granted a leave from Kansas State College for graduate study in farm management at Iowa State College.

Russell Childress, who received his Ph.D. degree from Cornell University in September, has joined the staff of the University of Maryland as Associate Professor of Marketing.

Allen Clark, who has been doing graduate work at Iowa State College, has been appointed assistant professor at South Dakota State College.

Harold B. Clark received his Ph.D. degree at the University of Kentucky in June, and has been appointed assistant professor.

Warren E. Collins, who is completing his work for the Ph.D. degree at the University of Illinois, joined the staff at Mississippi State College as Regional Leader for the Dairy Marketing Research Project.

Albert Conley has resigned from the Missouri Experiment Station to join the Sanitary Milk Producers of St. Louis.

Jay Coryell has retired from the Fruit and Vegetable Section of the Cooperative Research and Service Division, Farm Credit Administration.

Joseph S. Davis, Director of the Food Research Institute of Stanford University, led a group of five Stanford professors who, during the past summer, conducted seminars in American Studies and gave lectures in Japan under a joint arrangement with Tokyo National University.

Robert L. Davis, Jr., of the Mississippi State College Experiment Station, has been promoted to the rank of assistant professor.

Lee M. Day, formerly of the University of Minnesota, has been appointed assistant professor at the University of Wisconsin.

Ellsworth DeMasters has accepted a position in the Division of Marketing and Transporation Research in the Bureau of Agricultural Economics.

Austin A. Dowell has returned to the University of Minnesota following a six months' study of the marketing of livestock in Europe, the Near East, and India.

Louis J. Ducoff, Labor Economist in the Division of Farm Population and Rural Life, Bureau of Agricultural Economics, attended the 33rd International Labor Conference at Geneva in June as an Agricultural Adviser to the U. S. delegates.

S. A. Dum, who received his Ph.D. degree at Purdue University in 1949, is now associate professor at the University of Delaware, teaching and doing research in Dairy and Farm Management.

John Elderkin, who has been doing graduate work at Iowa State College, has been appointed economist with the Tennessee Valley Authority.

Charles M. Elkinton, Chairman of the Department of Agricultural Economics, Washington State College, has taken a year's leave of absence to accept an assignment in the Economic Cooperation Administration. He is to be in charge of the Plans and Programs Section, Food and Agriculture Division, with headquarters in Paris.

Eric Englund, American Agricultural Attache in Sweden and Finland for the past four years, has been named Assistant Director of the Office of Foreign Agricultural Relations of the Department of Agriculture. He succeeds A. Rex Johnson, now a Professor of Marketing at the University of Maryland.

Helen Farnsworth, Economist in the Food Research Institute of Stanford University, has been promoted to the rank of full professor.

Irving Fellows is on leave from the University of Connecticut to do graduate work in agricultural economics at Iowa State College.

G. W. Forster, formerly Head of the Department at North Carolina State College, is now Professor of Agricultural Economics. He will be engaged in undergraduate and graduate teaching, consulting, research, and writing. A second revised edition of his book on Farm Management will be published in 1951.

John C. Frey has accepted a position as Assistant Professor of Land Economics at the Pennsylvania State College, to begin in February, 1951. He is now working toward his Ph.D. degree at Iowa State College.

Varden Fuller is on leave from the University of California to accept

the appointment as Executive Secretary in charge of staff of the President's Commission on Migratory Labor.

J. K. Galbraith of Harvard University spent the past summer in England and Western Europe, devoting part of his time to an analysis of the refugee problem of Western Germany for the Economic Cooperation Administration.

William N. Garrott has recently accepted a position in the Division of Marketing and Transportation Research, Bureau of Agricultural Economics.

M. R. Godwin, formerly of the University of Maryland, is now Associate Professor of Agricultural Economics at the University of Florida.

J. R. Greenman of the University of Florida has been given a year's leave of absence to work with the Economic Cooperation Administration. His assignment will be in France, Greece, and Italy.

Nelda Griffin, formerly with the Food Division of the Office of Domestic Commerce of the Department of Commerce, has joined the staff of the Business Administration Section of Cooperative Research and Service Division, Farm Credit Administration.

Paul W. Griffith, Extension Economist in Farm Management, has been appointed Associate Dean and Associate Director of the Extension Service, Kansas State College.

Reid Grigsby of Louisiana State University is doing graduate work at Harvard University.

Margaret Jarman Hagood, Division of Farm Population and Rural Life, Bureau of Agricultural Economics, was recently elected a Fellow of the American Statistical Association.

Dale E. Hathaway has been granted a year's leave of absence from the Extension Service of Michigan State College to pursue graduate work at Harvard University.

Earl O. Heady has been appointed a Faculty Research Fellow of the Social Science Research Council for a term of three years beginning September, 1950. Dr. Heady will continue his residence at Iowa State College.

W. E. Hendrix is on leave from the University of Georgia making a study of the extent of under-employment of rural families for the Subcommittee on Low-Income Families of the Joint Committee on the Economic Report.

Jimmye S. Hillman, formerly of Mississippi State College, has been appointed assistant professor at the University of Arizona to carry on research in agricultural trade barriers in the Western States.

William S. Hoofnagle has recently accepted a position in the Division of Marketing and Transportation Research, Bureau of Agricultural Economics.

Brian How has joined the staff of the University of Saskatchewan, Canada. He received his Ph.D. degree from Cornell University in September.

Roy E. Huffman, Associate Professor of Agricultural Economics, is

Acting Head of the Departments of Agricultural Economics and Rural Sociology, and Economics and Sociology, at Montana State College during the six months' absence of Dr. M. M. Kelso. Mr. Huffman returned recently from a year of graduate study at the University of Wisconsin.

Rufus B. Hughes, Associate Economist of the University of Tennessee Agricultural Experiment Station, has taken leave to pursue graduate study at the University of Chicago for a year.

T. H. Hurd, Professor of Land Economics at Cornell University, has been appointed Director of the Budget of New York State.

W. E. A. Husmann, formerly Agricultural Economist and Professor of Farm Management at Clemson College, will have charge of Professor Greenman's work at the University of Florida during the latter's absence in Europe. Dr. Husmann will also devote some time to the management of citrus properties.

H. B. James became Head of the Department of Agricultural Economics, North Carolina State College, on April 1, after six months of studying the work of various institutions throughout the United States, and pursuing one quarter of post-doctorate work at the University of Chicago.

W. E. Keeper recently resigned from the staff of the Pennsylvania State College to accept the position of Chairman of the Department of Agriculture at the Southern Illinois University.

M. M. Kelso, Head of the Departments of Agricultural Economics and Rural Sociology, and Economics and Sociology, Montana State College, will be on leave from September 20, 1950 to March 20, 1951. Dr. Kelso will study public land management and livestock production in Australia.

Frank P. King, Professor of Agricultural Economics at the University of Georgia, has been appointed Resident Director of the Coastal Plains Experiment Station at Tifton, Georgia.

Donald Kuryloski has recently accepted a position in the Division of Statistical and Historical Research, Bureau of Agricultural Economics.

Joseph A. Martin, University of Tennessee, has taken leave to study at the University of Minnesota for the current academic year.

George L. Mehren of the University of California participated in the Long Session of Swift and Company's summer program for economists. The fellowship award from the Company permitted him to spend five weeks studying the dynamics of industrial organization and its price and production policies.

Joe H. Miller has resigned from the Bureau of Agricultural Economics to enter the Navy.

Alexander J. Morin has resigned from the Chairmanship of the Economics Department of Fisk University to accept an appointment as Research Associate in the Department of Economics of the University of Chicago, to study the socio-economic impact of mechanization on the Delta Cotton area.

M. L. Mosher, Professor of Farm Management at the University of Illinois, will retire at the end of the year. He plans to remain in Urbana. Professor Mosher has long been associated with the development of the

Farm Bureau Farm Management Service project, which now includes about 2,600 farmers in eight associations covering 59 counties.

Roger Murphy has joined the staff at Virginia Polytechnic Institute as Associate Professor of Farm Management, after receiving his Ph.D. degree from Cornell University in September.

C. V. Noble was made Dean of the College of Agriculture at the University of Florida in July and H. G. Hamilton succeeded him as Head of the Department.

John A. Nordin, Iowa State College, is now devoting part of his time to agricultural economics research in the field of price analysis.

Russell Olson has been appointed agricultural economist with the Division of Farm Management and Costs, Bureau of Agricultural Economics, stationed at Iowa State College, to conduct a feed utilization study.

Howard Ottosan, who has been doing graduate work at Iowa State College, has been appointed assistant professor at the University of Illinois.

Howard L. Parsons transferred from the Bureau of Agricultural Economics to the State Department in August, after four months "on loan" to the Twentieth Century Fund for a first-hand study of the prospects and problems of economic development of Costa Rica, under the U. S. Point Four program.

Wilfred Pine of Kansas State College is serving with the agricultural mission of the Economic Cooperation Administration in Ankara, Turkey. Howard R. Dorsett succeeds him as Assistant Professor in Land Economics.

Homer Preston has transferred from the Fruits and Vegetable Section to the Dairy Section of the Cooperative Research and Service Division, Farm Credit Administration.

Winston E. Pullen has completed his work for his Ph.D. degree at Cornell University and has returned to the University of Maine where he will be devoting three fourths of his time as Assistant Professor in Agricultural Economics and Farm Management, and one fourth as Agricultural Economist in the Experiment Station.

S. T. Rice, who recently completed the requirements on his Ph.D. degree at the University of Illinois, is now associate professor at the University of Delaware doing teaching and research in inter regional competition in the marketing of farm products.

George L. Robbins of the Bureau of Agricultural Economics is a member of the U. S. delegation to the International Conference on Tariffs and Trade held at Torquay, England, beginning September 28, 1950.

William H. Scofield has transferred from the Division of Land Economics, Bureau of Agricultural Economics, to the Division of Economic Information, where he is Secretary of the Outlook and Situation Board, succeeding Robert C. Tetro (see below).

R. Seltzer, University of Arizona, is on leave to pursue graduate study at the University of California.

G. S. Shepherd, Iowa State College, has available for distribution a

limited number of copies of the seminar lectures and discussions at the Iowa State College Marketing School held during the past summer.

Erling D. Solberg, Division of Land Economics, Bureau of Agricultural Economics, has completed field work on a cooperative study with the University of Wisconsin Law School, and has returned to his former assignment in the Washington office.

Herman M. Southworth has been appointed Economic Analyst in the office of the Chief of the Bureau of Agricultural Economics, replacing Howard Parsons.

Harold L. Streetman, a graduate of Oklahoma A. & M. College, has joined the staff of the South Carolina Experiment Station as Assistant Agricultural Economist.

G. P. Summers, University of Kentucky, is on a year's leave of absence to do graduate work at the University of Minnesota.

Robert Suter has assumed his duties as Assistant Professor of Agricultural Attache for the State Department in Rome.

Maurice C. Taylor, formerly of Washington State College, has been appointed Associate Professor of Agricultural Economics and Economics at Montana State College.

Robert Tetro, Secretary of the Outlook and Situation Board in the Bureau of Agricultural Economics since 1946, has resigned to accept a position as Agricultural Attache for the State Department in Rome.

Robert Tompkin, who has been doing graduate work at Iowa State College, has been appointed assistant professor at the University of Wyoming.

Raymond H. Tremblay, University of Vermont, has been granted a year's leave of absence for additional graduate study at Cornell University.

David Weeks has just returned from a four months' leave of absence from the University of California spent in Washington, D. C., as Chairman of the Committee on Water Resources Policy.

Carl F. Wehrwein since last April has been serving as Assistant Economic Commissioner of the Economic Cooperation Administration mission to Austria, with headquarters in Vienna.

Harry R. Wellman, Director, Giannini Foundation, University of California, is on sabbatical leave making a study of the long-run outlook for exports of California fruits in Europe. He will return about January 1.

Chester M. Wells, Jr., of the Mississippi State College Experiment Station, was promoted to the rank of assistant professor.

Thomas J. Whatley, University of Tennessee, has returned from Purdue University where he has completed his studies for his Ph.D. degree, to rejoin the Experiment Station Staff.

Peairs Wilson, in charge of research and teaching in livestock marketing at Kansas State College, has returned from a sabbatical leave spent in graduate study at the University of California.

PRIZE AWARDS FOR 1951

The American Farm Economic Association will make the following awards in 1951: (1) Award for the best article published in the *Journal of Farm Economics* in 1950, (2) Awards for published reports of research in the field of Agricultural Economics and (3) Awards for theses submitted in partial fulfillment for the degree of Doctor of Philosophy in departments administering majors in Agricultural Economics.

Award for Best Journal Article

For the best article published in the *Journal of Farm Economics* during the calendar year 1950 an award of $100 will be made.

Awards for Published Reports of Research in Agricultural Economics

1. For the year 1951 there will be three prize awards of $250.00 each. Each award will be in a different field of Agricultural Economics.
2. Papers which are submitted will be classified in the following fields and persons submitting the papers should indicate the field in which they believe they should be classified.
   - (a) Farm management and production economics
   - (b) Agricultural marketing
   - (c) Agricultural prices
   - (d) Agricultural finance
   - (e) Land economics
   - (f) Theory and methodology
   - (g) Agricultural policy
3. Selections will be made from published research bearing the publication date of 1950.
4. Reports of research published in the *Journal of Farm Economics* by persons 40 years of age or less at time of publication shall be eligible both for an award for published research and for the best *Journal* article.
5. Only papers submitted by persons 40 years of age or less at the time of publication will be considered.
6. The prize awards committee will be made up of seven persons, in addition to the Chairman, representing the various fields which have been designated. All will be members of the American Farm Economic Association.
7. Papers must be in the hands of the Chairman of the Committee, E. C. Young, Purdue University, on or before February 1, 1951.
8. Members of the Prize Awards Committee will not be eligible to submit papers of their own.
9. Announcement of the awards will be made on or before the time of the 1951 annual meeting of the American Farm Economic Association.

Awards for Ph.D. Theses

1. For the year 1951 there will be three awards for Ph.D. theses of $250 each.
2. Theses in any field of Agricultural Economics may be submitted.

Theses prepared by candidates for the Ph.D. degree in any department of Economics or Agricultural Economics in the United States are eligible for consideration.

3. Selections will be made from theses submitted during the calendar year 1950.

4. The head of each department of Agricultural Economics or Economics in the United States where Ph.D. programs are administered will be eligible to submit one thesis.

5. A published Ph.D. thesis may be submitted in both the published report and Ph.D. thesis classes but shall be eligible for an award in only one of these two classes.

6. Theses must be in the hands of the Chairman of the Committee, E. C. Young, Purdue University, on or before February 1, 1951.

7. The prize awards committee will be made up of three persons in addition to the Chairman. All will be members of the American Farm Economic Association.

8. Announcement of the awards will be made on or before the time of the 1951 annual meeting of the American Farm Economic Association.

F. F. HILL, *President*

See back cover page of Proceedings issue for the announcement of the 1950 winners.

WARREN C. WAITE

1896–1950

"God's finger touched him and he slept." These words of Tennyson apply to the sudden passing of Warren C. Waite in the early hours of November 11, 1950. The loss of one of the outstanding agricultural economists in the full vigor of life is tragic. Professionally it hits hardest the Division of which he was a member and the University which he served so long and well. It is a loss, however, which is shared by the American Farm Economic Association and the field of Agricultural Economics as well as Social Science generally.

Dr. Waite received his B.S. degree from Minnesota in 1919, his M.A. in 1921 and his Ph.D. in 1924. He was a research assistant from 1922 to 1924. He held the rank of Assistant Professor from 1924 to 1927; Associate Professor from 1927 to 1930 when he was advanced to rank of full Professor. He was given leave from 1928 to 1930 to serve with the Bureau of Agricultural Economics, and worked with other governmental agencies for shorter periods at various times.

Death came less than three months after the completion of his year's term as President of the American Farm Economic Association. He earlier (1935) served the Association as Vice President. He was editor of this *Journal* from 1944 to 1949 and the quality of the *Journal* during his editorship is adequate testimony of his valuable contribution to the Association in that capacity. From 1947 to the time of his death he was the Association's representative on the Board of Directors of the National Bureau of Economic Research. He also served on the Board of Editors of the *Journal of Marketing*.

His lines of special interest were agricultural prices, statistics, and consumption economics. He kept abreast of and contributed to the development of these lines while retaining a high level of competence in the entire field of Agricultural Economics.

He was outstandingly effective as a teacher and research worker. Large numbers of students have gained much from his guidance and instruction. This applies especially to several hundred graduate students who came to know him well during his period of service.

He was modest, patient and unassuming. These traits associated with confidence arising from competence in the subjects with which he dealt explain in large measure his effectiveness as well as the admiration and respect he enjoyed among his contemporaries. He never was dogmatic. He relied on reasoning, not on bombast. His colleagues depended upon his judgment, training, and experience for help and guidance which he gave without stint or thought of credit.

His books include "Economics of Consumption" (1928), "The Consumer and the Economic Order" (with Ralph Cassady, Jr., 1938) and "Agricultural Prices" (with H. C. Trelogan). The latter, first published in processed form, is being revised for printing. He had the last installment of galley proof on his desk when his summons came. A considerable number of bulletins and journal articles leave a legacy for the use and guidance of workers for the years ahead.

As a colleague and coworker, the undersigned believes that Warren Waite would have accepted the following quotation as representative of his philosophy:

"Give me to die unwitting of the day,
and stricken in life's brave heat,
with senses clear."

O. B. JESNESS